

DELAYED CHILDBEARING:  
A PLANNED BEHAVIOUR OR  
AN UNINTENTIONAL OUTCOME?

A Thesis Submitted to the College of  
Graduate Studies and Research  
in Partial Fulfillment of the Requirements  
for the Degree of Master of Arts  
in the Department of Psychology  
University of Saskatchewan  
Saskatoon

By

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## ABSTRACT

Knowledge levels of issues related to fertility, reproduction, and assisted reproductive technology (ART) are low among the general population. There have also been increasing trends for women to delay childbearing and for many individuals to turn to various forms of ART to aid reproduction. Many commentators assume the provision of information targeting fertility related issues and ART will be influential in altering women's intentions related to delay childbearing, but there is a lack of both empirical and theoretical evidence to support this assumption. Further, suggestions for how to provide education related to fertility and ART have not yet been examined. The present study examined the applicability of the theory of planned behavior (TPB) for predicting women's intentions to delay childbearing and whether the provision of detailed, accurate, and accessible information regarding reproduction, factors influencing fertility, and the limitations of fertility treatments would alter individual attitudes and levels of perceived control surrounding delayed childbearing. Participants received one of two informational interventions (i.e., fertility-related or alcohol-related information) then completed a questionnaire measuring the constructs of the theory of planned behavior. It was predicted that the theory of planned behavior would provide an adequate framework for examining women's intentions to delay childbearing in that attitudes, subjective norms, and perceived control would all emerge as significant predictors of these intentions (hypothesis 1). It was also predicted that the provision of detailed, accurate and accessible information regarding reproduction, factors influencing fertility, and the limitations of fertility treatment would alter young women's intentions to delay childbearing (hypothesis 2). Multiple regression analyses provided support for Hypothesis 1 and substantiated that TPB provides an adequate framework for examining women's intentions to delay childbearing. Hypothesis 2 was partially supported such that the intervention groups

significantly differed with respect to their delayed childbearing intentions. However, most of the women in this sample did not evidence intentions to delay childbearing into critical fertile periods. Future research is warranted to examine the theory of planned behavior's ability to predict delayed childbearing over time, across cohorts, and amongst men, as well as the impact of improved reproductive technologies and media reports of fertility on intentions to delay childbearing.

## ACKNOWLEDGMENTS

I would first like to thank my supervisor, Dr. Karen Lawson. Thank you for reigning in my desire to take on more than I should, for allowing me to explore the depth of my research interests and abilities, and for always treating me like a colleague and friend. I will reflect back on these years as your graduate student and recall fond memories, conversations that positively shaped my outlook on life, and the development of a working relationship that transcended the traditional student-supervisor model.

I am also extremely grateful for the invaluable feedback and support provided by my committee members Dr. Pamela Downe and Dr. Roger Pierson. Thank you for your kind words during meetings and email exchanges, for taking the time to read and provide feedback for my work, and for showing me other perspectives with respect to my research projects.

Data were collected through the University of Saskatchewan Psychology Participant Pool. This research project could not have been conducted without the financial assistance provided to me by the University of Saskatchewan Psychology Department and the Social Sciences and Humanities Research Council (SSHRC) Joseph-Armand Bombardier Canada Graduate Scholarship Masters Award.

A special thank you to all of my friends and colleagues in the department who provided support in various ways, including stopping by my office for quick chats, partaking in after school visits to my favourite Saskatoon pubs, and providing invaluable feedback on my research. Finally, I would like to thank my friends and family from back home in Ontario – especially my mother. Coming to Saskatoon was the start of an incredible journey for me, and adjusting to life in the prairies was easier because I knew that you were all behind me and proud of all that I was accomplishing. I love you all very much and hope that I can continue to make you proud.

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## CHAPTER 1 INTRODUCTION

The majority of men and women have strong intentions to have biological children one day, yet not all individuals realize their fertility intentions. Factors which can prevent people from realizing their fertility intentions include difficulties with conception (i.e., infertility/low fertility) and postponing the age at which an individual has their first biological child.

Researchers have recognized a number of trends related to these factors. The first trend is that fertility rates in many countries like Canada and the United States have declined (Virtala, Vilska, Huttunen, & Kunttu, 2011; Daniluk, Koert, & Cheung, 2012). *Fertility rate* is defined as the ratio of live births in an area to the population of that area expressed per 1000 population per year and *total fertility rate* is defined as the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates (Statistics Canada, 2012). *Age-specific fertility rate* refers to the number of births to females in a specific age category in a particular year compared to the number of females in that age category (United Nations, 2009; Statistics Canada, 2012). This value is derived by dividing the number of births during the reference year to females of a specified age at the time of the birth by the number of females of that age in that reference year (Statistics Canada, 2012). The average number of children per woman in Canada was estimated to be 1.66 as of 2007 and 1.68 in 2008, which is well below the replacement level of 2.1 children per woman (Johnson & Tough, 2012; Statistics Canada, 2012). The last year that the total fertility rate exceeded the replacement level of 2.1 was in 1971 (Statistics Canada, 2012).

The other trend which has been identified is that more women are delaying the age at which they have their first biological child (Tough, Tofflemire, Benzies, Fraser-Lee, & Newburn-Cook, 2007; Cooke, Mills, & Lavender, 2010; Johnson & Tough, 2012). Postponement

of first births has been correlated with smaller family size and increased childlessness which both contribute to the overall decline in fertility rates experienced in countries like Canada (Lampic, Svanberg, Karlstrom, & Tyden, 2006; Carolan & Frankowska, 2010; Wright, 2011; Virtala et al, 2011; Johnson & Tough, 2012; Daniluk et al., 2012). More women over age 30 years are giving birth and the proportion of first births occurring among women in this age group has been increasing (Cooke et al., 2010; Johnson & Tough, 2012). In 2006 the average age of Canadian women who gave birth for the first time was 29.3 years (Statistics Canada, 2012). The proportion of first births occurring among women between 30 and 34 years increased from 18.9% in 1982 to 31.4% in 2006 (Johnson & Tough, 2012). From 1982 to 2006 the proportion of live births to women between the age of 35 to 39 and 40 to 44 increased from 4.7% to 14.8% and from 0.6% to 2.8%, respectively (Johnson & Tough, 2012).

Researchers have examined factors which may explain declining fertility rates and the increasing trend of postponement of first births. Knowledge levels of issues related to fertility, reproduction, and assisted reproductive technology (ART) are low among the general population (Daniluk et al., 2012; Johnson & Tough, 2012). There has also been an increasing trend for many individuals to turn to various forms of ART to aid reproduction (Wright, 2011; Johnson & Tough, 2012; Wyndham, Figueira, & Patrizio, 2012). This trend may be partly a consequence of increased rates of delayed childbearing (Tough et al., 2007) as the use of ART seems to be occurring much more frequently among older women (aged 41 years or older) (Wyndham et al., 2012). Many individuals are unaware though that the effectiveness of ART declines after the age of 35 years (Johnson & Tough, 2012). As the number of women delaying pregnancy and using ART has grown, so too have the rates of pregnancy loss and obstetric complications increased (Johnson & Tough, 2012; Wyndham et al., 2012). Specifically, the risk of pregnancy

complications and adverse outcome increases with both maternal age and the use of ART (Johnson & Tough, 2012). Consequently, many individuals are unable to realize their fertility potential as a result of delaying childbearing and find that they are unable to have biological children.

The recognition of the low level of fertility, reproduction, and ART knowledge among the population has led a number of researchers to conclude that there is a need for greater public education on these topics. Specifically, these commentators believe that individuals should be better informed about age-related fertility declines as well as the availability, costs, and limitations of ART (Rovei et al., 2010; Hashiloni-Dolev, Kaplan, & Shkedi-Rafid, 2011; Wright, 2011; Virtala et al., 2011; Ekelin, Akesson, Angerud, & Kvist, 2012; Johnson & Tough, 2012; Peterson, Pirritano, Tucker, & Lampic, 2012; Daniluk et al., 2012; Daniluk & Koert, 2013). The rationale for providing this information is twofold: 1) the majority of sex education curricula generally do not cover these topics (SIECCAN, 2009), and 2) women might benefit from this education with respect to their ability to make more informed reproductive decisions. The impact of information intervention efforts targeting women's intentions to delay childbearing has not yet been examined in the literature. Furthermore, much of the existing literature is based on descriptive, atheoretical research that is limited in terms of informing intervention protocols.

The purpose of this research project was to expand on the existing literature by examining the impact of informational interventions on young women's reproductive intentions using the theoretical framework of the theory of planned behavior. This study was designed to address the following general research questions: 1) Can the theory of planned behavior be used to explain individual intentions to delay childbearing? 2) Will the provision of information

regarding fertility, reproduction, and ART affect young women's intentions to delay childbearing?

### **1.1 Brief Overview of Fertility and Infertility**

Fertility, or fecundity, is defined as the ability to biologically produce offspring (Hyde, DeLamater, & Byers, 2012). There are a number of factors which can negatively impact fertility for both men and women. Specifically though, maternal age is thought to be the most important determinant of fertility (Balasch & Gratacos, 2010; Johnson & Tough, 2012). From a biological perspective, a woman's reproductive functioning theoretically lasts from menarche to menopause (Virtala et al., 2011) and the optimum time period can range from 20 to 35 years (Johnson & Tough, 2012). However, the biological peak period for childbearing is generally between 20 and 25 years of age (Becker, 2001; Dunson, Baird, & Colombo, 2004; Buss, 2005; Ammer, 2009; Easton, Confer, Goetz, & Buss, 2010; Zhang, 2011; Murray & Pizzorno, 2012). Female fertility begins to significantly decline many years prior to the onset of menopause, starting at approximately age 28 onwards with the decline becoming much faster after age 35 (Lampic et al., 2006; Tough et al., 2007; Balasch & Gratacos, 2010; Bretherick, Fairbroter, Avila, Harbord, & Robinson, 2010; Virtala et al., 2011; Peterson et al., 2012). After age 35 fertility decreases substantially for women and the chance of miscarriage, spontaneous abortion, pregnancy complications, and adverse pregnancy outcomes increases (Johnson & Tough, 2012). For some women fertility may be close to zero by the time she reaches 45 years of age (Bretherick et al., 2010). This occurs primarily because of decreased quality and quantity of oocytes (Balasch & Gratacos, 2010; Bretherick et al., 2010) and an increase in the rate of miscarriage (Bretherick et al., 2010; Peterson et al., 2012). At 20 weeks gestation female fetuses have about 6-7 million

oocytes, 1-2 million at the time of birth, 250,000 at menarche, 25,000 at 37 years, and only a few hundred or thousand at the end of reproductive life (Balasch & Gratacos, 2010).

Infertility refers to a woman's inability to conceive and give birth to a living child or a man's inability to impregnate a woman (Hyde et al., 2012; World Health Organization (WHO), 2013), and is considered to be a global health issue. Worldwide incidence of infertility estimates vary, but some have estimated rates to be approximately 8 to 12% of couples with women of childbearing age, affecting between 50 and 80 million people (Benyamini, Gozlan, & Kokia, 2005; Aleyamma, Kamath, Muthukumar, Mangalaraj, & George, 2011; WHO, 2013). Defining infertility poses some difficulty as there are a number of variables to take into consideration, including frequency of intercourse, number of months spent trying to conceive, contraceptive use, and childbearing intentions (Gurunath, Pandian, Anderson, & Bhattacharya, 2011).

Couples are considered infertile by the medical community if they have not conceived after having frequent, unprotected sexual intercourse for one year (Benyamini et al., 2005; Daniluk & Tench, 2007). The medical definition of infertility is shortened to a six month timeframe of active attempts to conceive if the woman is over 35 years (Barrett, 2006). This variation acknowledges that the woman's age is the most important determinant of a couple's overall fertility (Balasch & Gratacos, 2010). Male factors are thought to be responsible for about 40 percent of infertile couples, and female factors are thought to be responsible for an additional 40 percent. Combinations of reproductive problems between the man and woman or unknown causes make up the remaining 20 percent of cases (Daniluk & Tench, 2007; Hyde et al., 2012).

The most common causes for female infertility include age, pelvic inflammatory disease (PID), sexually transmitted infections (STIs), and problems with ovulation (Hyde et al., 2012). Other less common causes include poor nutrition, eating disorders, exposure to toxic chemicals,



smoking, and use of alcohol, narcotics, or barbiturates (Hyde et al., 2012). The most common causes for male infertility include low sperm count (less than 20 million sperm per millilitre of ejaculate), poor sperm mobility (not good swimmers), and poor sperm quality (Hyde et al., 2012). The causes of these issues include infections and exposure to STIs, smoking, exposure to toxic agents, obesity, exposure to estrogens, and age (Hyde et al., 2012). Common combined factors include immunologic responses (e.g., allergic reactions to sperm or immune system reacting to the fetus or placenta), disruption of sperm chemical sensors, and lack of knowledge regarding timing intercourse (Hyde et al., 2012).

Both men and women report experiencing considerable psychological distress when experiencing trouble with conceiving (Greil, McQuillan, Johnson, Slauson-Blevins, & Shreffler, 2009; Daniluk, 1991; Daniluk & Tench, 2007). Common feelings include low self-esteem, isolation, loss of control, sexual inadequacy, and depression (WHO, 2013). Health in general is defined by the World Health Organization as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (WHO, 2013). Therefore, infertility is considered to be a source of diminished health and social well-being.

## **1.2 Advanced Maternal Age and Delayed Childbearing**

Despite most women being at risk for experiencing the effects of the age-related decline in fertility, the average age of first birth has significantly increased for women from developed nations (Benzies, 2008; Carolan & Frankowska, 2010). The increase in average age has been explained largely by the increase in first births among women aged 35 years and older (Carolan & Frankowska, 2010; Statistics Canada, 2012). Advanced maternal age (AMA) is defined by much of the medical community as age 35 years or older (Rajaei, Amirzadeh, Mirblook, & Soltani, 2010; Bayrampour, Heaman, Duncan, & Tough, 2012). Pregnancy at this time in a

woman's life is considered to be "high risk" because it is associated with a number of adverse outcomes (Jacobsson, Ladfors, & Milsom, 2004; Cleary-Goldman et al., 2005; Tough et al., 2007; Bretherick et al., 2010; Bayrampour et al., 2012). Specific risks include the following: greater risk of fetal loss or miscarriage; ectopic pregnancy; stillbirth; increased chance of chromosome anomalies; increased chance of multiple conception; increased risk for maternal medical complications (e.g., hypertension, pre-gestational diabetes, and gestational diabetes); and increased risk for labour and birth complications (e.g., placenta previa, caesarean birth, preterm birth, placental abruption, and low birth weight) (Best Start, 2007).

Most Canadian women though are not postponing childbearing past 35 years of age. In 2009 it was estimated that only about 11% of first births in Canada occurred among women aged 35 years and older (Balasch & Gratacos, 2010; Johnson & Tough, 2012). The national average age of mothers who gave birth to their first child was 30.1 years in 2009, but this value ranged by region. For example, the average age of mothers who gave birth for the first time in Ontario and British Columbia was 30.1 years and for Nunavut and Saskatchewan the average age of first birth for women was 25.1 and 27.2 years, respectively (Statistics Canada, 2012). Overall, there are relatively few women in Canada who delay childbearing past the age of 30. For example, in Saskatchewan in 2009 it was estimated that only 33.6% of all births were to women over the age of 30 (Statistics Canada, 2012). So while rates of women giving birth to their first child past age 35 have steadily increased in the last 30 years (Tough, et al., 2007; Cooke et al., 2010; Johnson & Tough, 2012), the majority of women are not delaying childbearing into this "high risk" age range. However, many are delaying past the biological peak period for childbearing (between 20 and 25 years) (Becker, 2001; Dunson et al., 2004; Buss, 2005; Ammer, 2009; Easton et al., 2010; Zhang, 2011; Murray & Pizzorno, 2012) and commencing childbearing when female fertility

begins to decline (age 28 onwards) (Lampic et al, 2006; Tough et al., 2007; Balasch & Gratacos, 2010; Bretherick et al., 2010; Virtala et al., 2011; Peterson et al., 2012)

### **1.3 Fertility Awareness**

The World Health Organization's mandate regarding sex education states that access to comprehensive reproductive health information and services is required for the achievement of reproductive health. Despite this mandate there is a lack of fertility awareness/knowledge in the general population. This lack of knowledge is especially high with regards to the duration of the reproductive lifespan, optimal fertile period during the menstrual cycle and likelihood of conceiving, as well as incidence of infertility and fertility risk factors (Bunting, Tsibulsky, & Boivin, 2013).

Many individuals believe that they are well educated on fertility issues despite research suggesting otherwise. It should be noted that the majority of studies which have examined knowledge levels of fertility have conducted the research using university students and/or individuals from high-resource countries making it difficult to generalize the findings (Bunting et al., 2013). The average participant reports being slightly more than "somewhat educated" on fertility issues or even "fairly knowledgeable" about fertility (Peterson et al., 2012; Daniluk & Koert, 2013). Yet when tested the majority of participants show a lack of knowledge regarding specific fertility related issues. For example, many individuals from a United States undergraduate sample overestimated the age at which women experience declines in fertility, with 37% of females and 31% of males believing a slight decrease in women's ability to become pregnant occurs between age 30 to 34 (Peterson et al., 2012). Almost half of the women from this sample (46%) and 60% of the men from this sample believed the fertility decrease occurs between 35 to 59 years of age (Peterson et al., 2012). Daniluk & Koert's (2013) sample consisted

of 599 childless men from 20 to 50 years of age and they found that overall knowledge about fertility was low with a slight majority of participants answering 6 of 16 knowledge questions incorrectly. Almost all of the men reported knowing that fertility declines with age, but slightly less than half believed that a woman's eggs are as old as she is. As well, less than half believed that the majority of fertility conditions are not exclusively a female factor and 43% knew that the age of her male partner is an important factor in a woman's chances of becoming pregnant (Daniluk & Koert, 2012).

These studies highlight the fact that many individuals believe they are sufficiently educated on fertility issues, yet when their knowledge is tested they do not evidence sufficient understanding. Dougall, Beyene, & Nachtigall (2013) asked a sample of first time mothers who had delivered their first child following IVF when they were 40 years or older to provide potential reasons for mistaken fertility beliefs. They identified the following factors: recollections of persistent and ongoing messaging about pregnancy prevention starting in adolescence; healthy lifestyle and family history of fertility; and incorrect information from friends, physicians, or misleading media reports on pregnancies in older celebrity women. Researchers argue that education about fertility issues is needed to prevent fear, unnecessary delay in seeking help when faced with problems conceiving, and to help prevent infertility in the first place (Bunting & Boivin, 2008; Virtala et al., 2011).

### **1.3.1 Optimal Fertile Period and Likelihood of Conceiving**

Although there are individuals who have relatively realistic perceptions about the most fertile period in a woman's life (Lampic et al., 2006), the majority do not show an adequate understanding of the menstrual cycle, the concept of fertile periods, and the likelihood of conception. Most individuals appear to have inadequate knowledge of when a woman is most

likely to conceive during the menstrual cycle (Hammarberg et al., 2012), overestimate the chances of pregnancy at the time of ovulation (Lampic et al., 2006; Tyden, Svanberg, Karlstrom, Lihoff, & Lampic, 2006; Bretherick et al., 2010; Bunting et al., 2013), and have little awareness of when women are most fertile (Blake, Smith, Bargiacchi, France, & Gudez, 1997; Adashi, Cohen, Hamberger, Hones, De Kretser, & Lunenfield, 2000; Bunting et al., 2013). The female and male Italian students in Rovei et al.'s 2010 study overestimated the monthly pregnancy rate of an optimally fertile, young couple with about 58% of females and 41% of males indicating that the monthly pregnancy rate for these couples ranges between 50 and 100%<sup>1</sup>. Only about half of respondents in this sample demonstrated adequate understanding of sexual and reproductive health. Of the large majority of participants who reported they understood their bodily reproductive functions, 23% gave incomplete or incorrect estimates of their most fertile period. In a national survey of 5086 Finnish undergraduate students more than half of the men and 43% of the women overestimated a couple's chance of conceiving during one year of unprotected intercourse at the age of 35 to 40 years (Virtala et al., 2011). The undergraduate students in Peterson et al.'s (2012) study vastly overestimated the likelihood of pregnancy following unprotected intercourse during the time of ovulation (92% of women and 82% of men). The same pattern was found when women and men were asked to estimate the likelihood of pregnancy after one year of unprotected intercourse. As well, 32% of women and 36% of men overestimated the age at which women are the most fertile believing women are most fertile between the ages of 25 and 44 years.

In a Canadian sample of 360 female undergraduate students most of the women significantly overestimated the chance of pregnancy at all ages (Bretherick et al., 2010). About

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<sup>1</sup> For women aged 20 the rate is estimated at 30% a month, for women aged 30 the estimate is 25% a month, and for women aged 40 20% or less a month (ASRM, 2008; Baird et al., 2005).

31% of the women sampled in a study conducted by Dougall et al. (2013) reported that they expected to get pregnant without difficulty at the age of 40. A sample of women seeking fertility treatment seemed to understand that aging has an effect on fertility and rates of miscarriage (Ryan, Maassen, Dokras, Syrop, & Van Voorhis, 2005). Similarly, the majority of Tough et al.'s (2007) sample of childless men and women recognized there is a relationship between older maternal age and conception difficulties. However, less than half knew that AMA can increase the risk of stillbirth, caesarean delivery, multiple birth, and preterm delivery. As well, many individuals also overestimate the chance of pregnancy loss at all ages (Bretherick et al., 2010).

Overall, the literature suggests that a lack of fertility knowledge among the general population is evident, particularly with respect to age-related fertility declines and concerns. Basing reproductive decisions on inaccurate information and insufficient understanding can lead many men and women to delay childbearing unnecessarily and subsequently experience difficulties conceiving, pregnancy and fetal complications, or involuntary childlessness. Specifically, insufficient knowledge about optimal fertile periods and likelihood of conceiving are thought to be common factors contributing to couples' difficulty with conceiving (Hyde et al., 2012). As well, overestimation of fertility and overestimation of one's chances of conceiving are additional major factors which may be contributing to the large proportion of women who postpone their first pregnancy to age 35 or older, which is biologically the time when they are most likely to experience a marked decline in fertility (Lampic et al, 2006; Tough et al., 2007; Balasch & Gratacos, 2010; Bretherick et al., 2010; Virtala et al., 2011; Peterson et al., 2012).

### **1.3.2 Incidence of Infertility and Fertility Risk Factors**

Most people are familiar with the term infertility yet few have an adequate understanding of how it is defined and often underestimate its prevalence within the general population

(Bunting et al., 2013). Many individuals also show a lack of understanding regarding fertility risk factors (Bunting & Boivin, 2008; Daniluk et al., 2012). A large sample of Swedish undergraduate students markedly overestimated women's fertility and both the men and women in this sample overestimated a couple's cumulative fertility during one year of unprotected intercourse (Lampic et al., 2006). Men had significantly more optimistic perceptions regarding age-related female fecundity than did women, but women were significantly more likely to overestimate fecundity at ovulation and the percentage of infertile couples than men (Lampic et al., 2006).

Other studies have found that some women's awareness of infertility is high and they tend to be aware of risk factors associated with infertility (e.g., age, hereditary factors/genetics) (EMD Serono, 2011). Yet there are still apparent gaps in knowledge. For example, almost one in three women thought that the use of hormonal birth control is a risk factor for infertility (EMD Serono, 2011). The majority of women underestimated the length of time it can take to become pregnant, believing it is easier to get pregnant than is the actual case (EMD Serono, 2011). Further, 9 out of 10 women underestimated the rate of infertility problems among women of advanced maternal age (EMD Serono, 2011) and the majority were unaware of the medical criteria for defining infertility for women (EMD Serono, 2011).

Knowledge about specific risk factors (e.g., smoking, STIs, etc.) for lower fertility is generally limited and often erroneous when it comes to factors that have no impact on fertility (e.g., being physically healthy, alcohol consumption) (Bunting et al., 2013). In Bunting and Boivin's study (2008) university students were aware of risk factors for infertility and correctly identified all of the high risk factors that could decrease an individual's chances of becoming pregnant. However, they were less knowledgeable regarding factors that in actuality have no

effect on fertility and therefore falsely endorsed fertility myths (e.g., benefits of rural living and exercising regularly). They also believed that these non-influential factors could actually increase a woman's fertility potential (Bunting & Boivin, 2008). Daniluk et al. (2012) found that the majority of childless women in her study assumed that good health and fitness are better indicators of fertility than age and that enhancing and maintaining good health and fitness can prolong fertility. Additionally, many individuals are unaware of the relationship between sexually transmitted infections (STIs) and subsequent infertility (Daniluk et al., 2012). The majority of Hammarberg et al's (2012) Australian sample of individuals who wished to have a child or another child in the future understood that female obesity and smoking can negatively affect fertility(59%), but fewer understood how these factors could also affect male fertility(30%). In another study a large majority believed that eating well and staying in shape would prolong fertility, but they did not understand the risks of smoking on fertility (Ryan et al., 2005).

These findings suggest that while many individuals possess an understanding of health risk factors, they lack specific knowledge regarding risk factors related to fertility. Believing that one could be more fertile by avoiding unhealthy behaviours and adopting healthful behaviours is an incorrect assumption. A healthy lifestyle is only tangentially related to fertility only in that it will reduce the exposure to risk factors (e.g., obesity). A healthy lifestyle, in and of itself, will not promote or prolong fertility. The results from Bunting and Boivin's 2008 study suggest that people could, if faced with infertility, engage in ineffective behaviours that could subsequently lead them to delay seeking effective interventions. Basing reproductive decisions on false beliefs and fertility myths can ultimately lead individuals to experience involuntary childlessness by delaying childbearing beyond the optimal biological period. Some researchers have even



contended that the ignorance of fertility issues by policy makers is negligent and that the psychosocial implications of infertility should be also acknowledged (Aleyamma et al., 2011).

### **1.3.3 Duration of the Reproductive Lifespan and Perinatal Risks**

While many women are aware of the increased risks of conception difficulties as women age and that fertility declines over the lifespan, most are unaware of the marked age-related decline in fertility (Bretherick et al., 2010; Bunting et al., 2013; Daniluk et al., 2012; Dougall et al., 2013). Women in general know very little about the limits of their reproductive systems (Wyndam et al, 2012). While some are vaguely aware that fertility decreases with age, they are often mistaken about exactly when the age-related decline in fertility takes place and how quickly it advances (Virtala et al, 2011; Peterson et al., 2012; Wyndham et al., 2012). Lampic et al. (2006) found that only a small proportion of participants understood that a slight decrease in women's fecundity starts before the age of 30 years and a marked increase occurs in the late 30s and about one-third of male participants believed that a woman's fecundity decreases dramatically after age 45 years (Lampic et al., 2006). These results were similar to another study where more than half of the men and about one-third of the women sampled believed that the marked decrease in female fertility begins after the age of 45 years (Virtala et al., 2011). Rovei et al.'s (2010) sample demonstrated understanding that female fertility declines with age and about half thought that the decline starts between 30 and 34 years. However, about 53% of females and 37% of males thought that the age at which female fertility markedly declines is actually 45 to 55 years (Rovei et al., 2010).

In a more recent study 30% of the women sampled expected their fertility to gradually decline until menopause at around 50 years of age (Dougall et al., 2013). Hammarberg et al (2012) asked a sample of Australian men and women about their fertility knowledge and most

respondents overestimated the age at which male and female fertility begins to decline by about 10 years. Further, only one in four correctly identified that female fertility begins to decline before age 35 years (Hammarberg et al., 2012). These studies are limited in that they mainly draw on student samples, yet awareness levels among medical professionals have also been shown to be low. Mortensen, Hegaard, Andersen, & Bentzen (2012) examined fertility awareness among female healthcare professionals – a group it was assumed would have greater awareness of fertility-related issues than the general public. Most of the women were aware of possible difficulties in conceiving if they postponed childbearing, but many were less knowledgeable about the impact of age on fertility and rates of conception. Almost a third underrated the impact of a woman's age on fertility believing that a woman's chance of conceiving during one month of unprotected coitus is 50% or higher. This value actually ranges from 20-30% depending on the age of the woman (Mortensen et al., 2012).

Even though most men and women are aware of the association between AMA and conception difficulties, they are generally unaware of the potential medical risks (e.g., stillbirth, caesarean delivery, multiple births, and preterm delivery) which can be faced by women who delay childbearing (Benzies, 2008). Tough et al. (2007) examined Canadian men and women's knowledge of perinatal risks and found that less than half knew that advanced maternal age was associated with risk of stillbirth, caesarean delivery, multiple birth, and preterm delivery. The researchers warned that poor understanding of the links between childbearing after age 35, pregnancy complications, and increased risk of adverse infant outcomes can limit an individual's ability to make informed decisions about the timing of childbearing (Tough et al., 2007).

These studies all highlight the general lack of awareness and understanding among men and women regarding the age-related decline in women's fertility, particularly regarding the age-

range it begins to decline. The increasing proportion of women who delay child-bearing past the age of 35 years in the last 20 years suggests that individuals may be basing their reproductive decisions on insufficient information. Basing reproductive decisions on inaccurate information and insufficient understanding can lead many men and women to delay childbearing and subsequently experience difficulties conceiving, pregnancy and fetal complications, or involuntary childlessness.

#### **1.4 Assisted Reproductive Technology**

Assisted reproductive technology (ART) is a general term which refers to methods used to achieve pregnancy by artificial or partially artificial means (Centers for Disease Control and Prevention (CDCP), 2013). Use of infertility treatments has dramatically increased in the United States and Canada (D'Angelo, Whitehead, Helms, Barkfield, & Ahluwalia, 2011; Bushnik, Cook Yuzpe, Tough, & Collins, 2012). About 1% of all U.S. births in 2006 were to women who had undergone ART procedures (D'Angelo et al., 2011). In Canada a total of 18, 454 ART cycles were reported to the Canadian Assisted Reproductive Technologies Register (CARTR) in 2010 (Gunby, 2010). Overall, 42.9% of women treated in 2010 became pregnant and 33.7% had a live birth (Gunby, 2010). D'Angelo and colleagues (2011) examined the birth outcomes of American women who used assisted reproductive technology (ART), ovulation stimulation, or no treatment. The prevalence of infertility treatment use overall among the women sampled was 10.9% (5.4% used ART procedures and 5.5% used ovulation stimulation medications). The researchers also found that the use of ART was associated with decreased fetal growth, decreased gestational length, and babies were likely to be small for gestational age (D'Angelo et al., 2011).

### **1.4.1 Various Forms of ART**

Many reproductive technologies have been developed in the last 30 years to assist individuals with conception. Some of the technologies, or methods, include assisted, or artificial, insemination, embryo transfer, in vitro fertilization, gamete intra-fallopian transfer (GIFT), and zygote intra-fallopian transfer (ZIFT). Assisted insemination is a means of accomplishing reproduction without sexual intercourse where semen is artificially placed in the vagina (Hyde et al., 2012). With embryo transfer a fertilized egg is transferred from the uterus of one woman to the uterus of another woman (Hyde et al., 2012). In vitro fertilization involves uniting a sperm and egg in a dish outside the human body and then implanting the fertilized egg in the uterus of a woman (Hyde et al., 2012). GIFT involves collecting sperm and eggs and then inserting them together into the fallopian tube where natural fertilization and implantation can take place (Hyde et al., 2012). ZIFT is considered an improvement over GIFT and involves fertilizing an egg with sperm in a laboratory dish and then inserting the fertilized egg into the fallopian tube where natural implantation can take place (Hyde et al., 2012).

### **1.4.2 Limitations and Low Success Rates of ART**

A woman's age is considered to be the most important determinant of fertility (Balasch & Gratacos, 2010). Infertility rates increase with a woman's age and age affects the success rates of infertility treatments (Balasch & Gratacos, 2010). While there are many available technologies to aid couples in conceiving, there are a number of limitations with ART and overall success rates are quite low. The effectiveness of many forms of ART decreases after the age of 35 for women (Maheshwari, Porter, Shetty, & Bhattacharya, 2008; Wright, 2011; Johnson & Tough, 2012). As well, most of the available technology is unable to fully compensate for the age-related decline in female fertility (Balasch & Gratacos, 2010; Virtala et al., 2011). Specifically, only about half of

the age-related decline in female fertility that occurs between 30 and 35 years and a third that occurs between 35 and 40 years can be overcome with IVF (Maheshwari et al., 2008; Balasch & Gratacos, 2010). It is also estimated that as the number of women who turn to ART at advanced ages has increased in the last few decades the percentage of cycles resulting in pregnancies in women over the age of 42 has remained relatively the same (Wyndham et al., 2012).

In 2009 the percentage of ART cycles resulting in pregnancies in women over the age of 42 was 9%, which was much lower than for women under age 35 years (48%) (Wyndham et al., 2012). When the considered outcome is live birth, these numbers are even smaller. Among women older than 42 years who undergo ART, only 4.2% will give birth to a child compared with 41.4% of women less than 35 years of age (Wyndham et al., 2012). A 2007 Canadian study found that in 8,972 IVF cycles where a woman used her own eggs the clinical pregnancy rate was 35.6% and live birth rate was 28.6%, whereas in 404 IVF cycles where donor eggs were used the clinical pregnancy rate was 44.6% and live birth rate was 36.1% (Gunby, Bissonnette, Librach, & Cowan, 2011). The donor eggs all came from women who were under 30 years of age. While the researchers were able to conclude that both the clinical pregnancy and live birth rates with the use of IVF had increased from previous years, these numbers are still relatively low. Among Canadian women younger than 35 years, 38 out of 100 gave birth per ART cycle compared to 28 out of 100 for women age 35 to 39 and 11 out of 100 for women 40 and older (Canadian Fertility and Andrology Society, 2010). Women who are older than 40 often have an improved chance of giving birth to a healthy child using donor eggs (Canadian Fertility and Andrology Society, 2010).

### **1.4.3 Prevalence of Infertility and Cost of ART**

Prevalence of infertility among couples of reproductive age was recently estimated to be between 7% and 17% in the United States (Smith et al., 2011; Aleyamma et al., 2011) and between 8.5% and 16% in Canada (Medical Advisory Secretariat, 2006). As previously noted, couples are considered infertile if they have not conceived after one year of frequent, unprotected intercourse, or after six months if the woman is over 35 years (Barrett, 2006).

Infertility treatments, such as IVF, are expensive and the majority of individuals cannot afford treatment. For example, the average cost of IVF per-cycle ranges from \$8,000 to \$15,000 US (Chambers, Sullivan, Ishuhara, Chapman, & Adamnson, 2009; Smith et al., 2011). In 2007 the overall cost of IVF was estimated to be \$1.8 billion in the United States (Smith et al., 2011)<sup>2</sup>. In the United States ART is self-financed and cost is a major barrier for couples seeking infertility treatment (Aleyamma et al., 2011). In Canada, despite the Canadian Charter of Rights and Freedoms stating that access to reproductive technologies should be equal for everyone (Law Reform Commission of Canada, 1992) most couples cannot afford fertility treatments. Coverage varies in Canada depending on the province. Some treatments are covered in Ontario by OHIP, but others are not. For example, those undergoing artificial insemination or with bilaterally blocked fallopian tubes and are under age 40 will be covered, but they are still required to pay lab fees (around \$3,000 to \$4,000) (IVF Canada, 2013). Quebec is currently the only province that reimburses all variations of IVF treatment (CADTH, 2013). Quebec's Ministry of Health pledged in 2008 to reimburse the cost of IVF treatment, but in 2009 they altered this plan to only remunerate a maximum of two cycles of IVF (CADTH, 2013). Alberta has considered policy options with respect to ART regulation and the funding of fertility treatments, but has not yet settled on the outline of this policy (CADTH, 2013). In sum, the majority of Canadians cannot

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<sup>2</sup> Comparable statistics could not be located for Canada.

afford to access reproductive technologies (Smith et al., 2011). Specifically in Canada, less than 15% of couples can afford fertility treatments (CADTH, 2013).

### **1.5 Awareness of Assisted Reproductive Technology**

In addition to an overall lack of awareness and understanding regarding human fertility, there are low levels of awareness and knowledge among the general population regarding ART. Intentions to use ART are generally high and favourable (EMD Serono, 2011; Johnson and Tough, 2012; Peterson et al., 2012) yet many individuals are unaware of the various treatment options available. A 2011 fertility knowledge survey conducted in the U.S. found that more than two in three women were unfamiliar with hormonal fertility injections and only about half were familiar with IVF and recognized it as a viable option to aid conception (EMD Serono, 2011). Overall, individuals are largely unaware of the limitations and low success rates of ART as well as the incidence of infertility and cost of treatments (Maheshwari et al., 2008; Rovei et al., 2010; Daniluk et al., 2012; Mortensen et al., 2012).

#### **1.5.1 Knowledge of ART**

The majority of people overestimate their level of knowledge regarding ART. Women are largely aware of the potential risks and complications of delaying childbirth, but many incorrectly believe that ART can reverse the effects of age (Balasch & Gratacos, 2010). It was shown in Daniluk et al.'s (2012) study that participants believed their ART knowledge was significantly greater than was evidenced by the actual number of items they correctly answered on a knowledge scale. Less than half of participants knew that the cost of IVF is generally greater than \$5,000, almost all believed that prior to menopause ART can help most women conceive using her own eggs, and about 31% knew that IVF poses some health risks for a woman (Daniluk et al., 2012). Women often overestimate the success rate of IVF and fail to

recognize that the chance of success of IVF is affected by the age of the egg donor (EMD Serono, 2011). In other studies examining participants' level of understanding of ART the success of these treatments in helping people conceive a child is often overestimated (Lampic et al., 2006; Peterson et al., 2012), with women being significantly more likely to overestimate the success rate than men (Lampic et al., 2006). As well, many individuals falsely believe that reproductive treatments will aid them in overcoming fertility problems associated with age (Maheshwari et al., 2008; Peterson et al., 2012).

### **1.5.2 Intentions to use ART**

Even though there is a lack of awareness regarding ART among the general population, many individuals report strong intentions to turn to ART should they face difficulties with conception. It has become more common for couples to opt for fertility treatments to improve their chances of conceiving as they age (Johnson and Tough, 2012; Peterson et al., 2012). Lampic et al. (2006) asked participants about their likelihood of undergoing IVF, adopting, or choosing not to have children. Women were significantly more likely to pursue IVF treatment or adoption and less likely to accept a life without children than were men (Lampic et al., 2006). In a U.S study more than half of the women said they would likely seek fertility treatment if faced with difficulty conceiving (EMD Serono, 2011).

### **1.5.3 Sources of Misunderstanding and Resulting Implications**

It has been suggested that the growing popularity of ART has given individuals the impression that female fertility can be manipulated at any age and that female fertility can be successfully influenced and overcome before menopause (Wyndham et al., 2012). Recognizing the general lack of awareness about fertility, the risks of pregnancy in an advanced age, and the effectiveness of ART is important because many older women are surprised to learn of their high



risk status and the possibility that they may become involuntarily childless (Wyndham et al., 2012). Even those women who correctly understand the natural limits of a female's reproductive abilities falsely believe in the effectiveness of ART (Wyndham et al., 2012). This is thought to be largely due to popular beliefs that advances in ART can compensate for the age-related decline in fertility and media coverage of extreme cases, which falsely reassures women that they can conceive at almost any point during their life (Balasch & Gratacos, 2010).

#### **1.5.4 Difficulties of Undergoing Infertility Treatments**

Success rates of infertility treatments for any given month can range from 10 to 20% (Benyamini et al., 2005). As a result, most infertile couples spend months and even years undergoing unsuccessful cycles of treatment which can lead to significant cognitive, emotional, physical, and relational stress. Infertility is often accompanied by increased psychological distress (Benyamini et al., 2005). Two major sources of stress for couples experiencing infertility treatment include the threat to the major milestone of parenthood and the time consuming and emotionally draining nature of the treatment (Benyamini et al., 2005). Worries that couples might have can include financial strain, marital conflict, and potential physical risks (Benyamini et al., 2005).

Daniluk and Tench (2007) examined the long-term adjustment of infertile couples following unsuccessful medical intervention. Having few or no available options (e.g., adoption or third-party reproductive options), little social support, poor emotional and physical health, and reliance on emotion-focused coping were all associated with poorer adjustment. Decreased sexual satisfaction was experienced by infertile couples after undergoing unsuccessful fertility treatments and with efforts to adjust to biological childlessness (Daniluk & Tench, 2007).

Grief responses and coping strategies to manage the stressful life event are common after IVF failures. In a study by Lee et al (2010) bargaining was the most common grief responses experienced by the women sampled. Women facing infertility may have higher negative psycho-emotional experiences in their life than women who do not experience infertility (Lee et al., 2010). Emotional responses among women experiencing infertility can include surprise/shock, denial, anger, isolation, guilt, depression, and acceptance (Lee et al., 2010). However, not all couples faced with conception difficulties seek out fertility treatment. While IVF is considered to be one of the most useful fertility treatment options, the invasiveness and discomfort of the treatment makes it a last hope for many women (Lee et al., 2010).

The experience of infertility tends to be more stressful for women who are more likely to report long-term negative effects on their self-esteem and feelings of womanhood (Pasch, Dunkel-Schetter, & Christensen, 2002; Benyamini et al., 2005). Compared to men, having children tends to be more important for women (Pasch et al., 2002). Many women feel strong pressure to fulfill the societal norm of motherhood and failing to conceive can become highly stigmatizing (Benyamini et al., 2005). Qualitative and quantitative studies examining the stress of infertility and its treatment have shown that infertile women often report feelings of anger, resentment, envy, and guilt (Benyamini et al., 2005). Feelings of powerlessness and lack of control predominate as the number of treatment failures increase (Benyamini et al., 2005). In a study conducted by Benyamini et al. (2005) women in their sample reported ten significant difficulties of undergoing infertility treatment: monthly anticipation of treatment results; lack of spontaneity in sexual relationship; uncertainty regarding the future; negative feelings aroused by the infertility problem; not being able to solve the problem on your own; questions and social pressure about childbearing; disruption to daily routine; feeling a lack of control over own life;

pain and physical discomfort involved in treatment; and impact on the way partner sees themselves (Benyamini et al., 2005).

Some researchers have attributed the lack of understanding about the limitations of assisted reproduction to newspaper headlines and television specials that present images and stories of women who have defied the odds and given birth after the age of 45 and even 50 years (Wyndham et al., 2012). Dr. Kimberly Liu, co-author of the new The Society of Obstetricians and Gynaecologists of Canada (SOGC) clinical gynaecology practice guideline, has stated that the main reasons women may be postponing childbearing are because they are overestimating the potential of ART and underestimating the risks and complications associated with delayed pregnancy (Wright, 2011). Therefore, she believes women and men need to be informed that age is the most important determinant of female fertility and that ART cannot compensate for the age-related decline in fertility (Johnson & Tough, 2012). Education regarding these facts is essential for enabling individuals to make informed reproductive decisions that are based on accurate information rather than misconceptions (Peterson et al., 2012).

### **1.6 Fertility Intentions**

Fertility intentions are thought to play a role in explaining contemporary fertility trends, act as a strong predictor of subsequent fertility, and operate as a key variable in predicting fertility behaviours (Testa, 2012). Most people intend to have children at some point in their lives and believe that becoming a parent is important (Lampic et al., 2006; Rovei et al., 2010; EMD Serono, 2011; Virtala et al., 2011; Bunting et al., 2013; Ekelin et al., 2012; Peterson et al., 2012). The majority of people report wanting at least 2-3 children (Lampic et al., 2006; Tyden et al., 2006; Rovei et al., 2010; Ekelin et al., 2012; Peterson et al., 2012) with men and women reporting differences with regards to the desired number of children. For example, Rovei et al.

(2010) found that the ideal number of children was considered between one and three children for women and one or two for men.

The subjective ideal age interval for having children is usually reported to be between 25-34 years (Lampic et al., 2006; Rovei et al., 2010; Virtala et al., 2011; Dougall et al., 2012; Ekelin et al., 2012; Peterson et al., 2012). Virtala et al. (2011) found that about two-thirds of female students and 42% of male students reported wanting their first child between the ages of 25 and 29 years, which falls within the fertile window for women. However, many women report wanting to time their first birth for age 29 and their last birth for age 35 – an age range marked by a decline in female fertility (Virtala et al., 2011; Tyden et al., 2006). One study found that the majority of women sampled planned to have children in their early 30s, three quarters of whom did not have any concerns about being able to conceive and the same percentage believing they would have an average or easier time becoming pregnant compared to most women (EMD Serono, 2011). Tyden et al. (2006) asked women how important it was for them to have children before they got ‘too old’ and 18% indicated it was very important to them. Very few individuals report age 40 and older as the optimal age-range for parenting (Dougall et al., 2012).

### **1.6.1 Discordant Fertility Intentions and Behaviour**

Intense theoretical, methodological, and policy debates have focused on the fact that while the majority of people plan to have biological children, there are many individuals who do not realize their fertility intentions (Toulemon & Testa, 2005; Iacovou & Tavares, 2011). The gap between average intended and average achieved fertility has increased over the last few decades (Iacovou & Tavares, 2011). In many countries fertility levels have fallen to below replacement levels, but a corresponding fall in fertility intentions has not occurred (Iacovou & Tavares, 2011). Many researchers have begun to investigate the factors which might explain this

disparity. The relationship between intended and actual fertility is not necessarily straightforward though as overall intentions can be poor predictors of future fertility because various demographic and social factors come into play (Toulemon & Testa, 2005). Demographic factors can include age, marital status, duration of relationship union, and number of children already born, while social factors can include employment status, income, and level of education (Toulemon & Testa, 2005). Stated fertility intentions do not necessarily have the same predictive value for all social groups. The most highly educated individuals are more likely to realize their fertility intentions and those who are unemployed are more likely to experience reduced fertility (Toulemon & Testa, 2005). In 2012, Testa investigated the relationship between women's education and lifetime fertility intentions. Similar to what was found in a previous study (Toulemon & Testa, 2005) she found that women's level of education has a positive association with lifetime fertility intentions. Other empirical evidence indicates that highly educated people intend to have more children than less educated people and also tend to revise their childbearing intentions downwards more frequently (Lampic et al., 2006; Testa, 2012). Canadian women who pursue higher education are more likely to delay childbearing (Health Canada, 2005). As well, first time parents today are better educated than first time parents 30 years ago (Best Start, 2007). This is important because the most significant factor in increasing delaying childbearing seems to be education for women.

Balbo and Mills (2011) investigated factors which can affect the realization of fertility intentions in order to gain insight on the forces that facilitate or inhibit the realization of childbearing intentions. The researchers found three main forces that seem to drive the discordance between desired and actual fertility: demographic factors (age, parity), socio-economic status (education and employment status), and ideational aspects (religion) (Balbo &

Mills, 2011). Expanding opportunities for higher education, desire for career and economic independence, as well as access to and use of highly effective contraception have all made it easier for more young women to delay childbearing (Balasch & Gratacos, 2010; Bayrampour et al., 2012). Decisions about the timing of childbearing can be influenced by many factors (Benzies, 2008; Iacovou & Tavares, 2011). A qualitative study conducted with women aged 20 to 48 years found that personal influences which can impact decisions about the timing of childbearing included independence, motivation to have a family, declining fertility, chronic health problems, and stable relationships (Benzies, 2008). In the same study, familial influences included partner readiness for childbearing, financial stability, and the influence of extended family. Increasing acceptability of advanced maternal age, divorce rates, and parental-leave policies in the workplace were all identified as societal influences that impacted decisions about the timing of childbearing (Benzies, 2008).

Fertility intentions also change as people's circumstances change or as they acquire new information (Iacovou & Tavares, 2011). As a result, fertility and family size intentions are rarely stable across young adulthood (Liefbroer, 2009). The timing of parenthood among both men and women is often influenced by the expected costs and rewards of childbearing (Liefbroer, 2005). For women anticipated costs to one's career and one's level of autonomy and an anticipated increase in one's sense of security can affect the timing of entry into motherhood (Liefbroer, 2005). For men anticipated costs to one's career and spending power and anticipated rewards in terms of one's sense of security and quality of the partner relationship can affect the timing of entry into fatherhood (Liefbroer, 2005). Adjustments to family size intentions tend to be downwards and are often influenced by change in partner, education, and career (Liefbroer, 2009). Liefbroer (2009) found that respondents who intended to postpone having children until

their 30s were more likely to adjust their family size intentions downwards than those who intended to start childbearing earlier.

### **1.6.2 Reasons for Delaying Childbearing**

Women's views and experiences of delayed childbearing have been relatively unexplored in the literature (Cooke, et al., 2012). Ryan et al. (2005) set out to determine the proportion and characteristics of women who report delaying childbearing and the most common reasons for delay. Reasons cited for delaying included not being financially ready, wanting to establish a career, desiring to wait for a period of time after marriage, and desiring a gap between children. Age, family income, and parity were not associated with delaying childbearing. They also found that women who delayed childbearing were better educated, had a better knowledge of fertility-related health issues, and were more likely to be fertile (Ryan et al., 2005).

Other researchers have examined factors that can also influence the timing of a first pregnancy for Canadian women. Delays in key life transitions (e.g., completing education, leaving home, establishing a career, finding a life partner) can influence the timing of childbearing for women (Best Start, 2007). Access to modern contraceptive methods and legal access to induced abortions in much of the Western world has significantly influenced the sexual practices and social lives of women by making it possible for them to control childbearing and postpone pregnancy (Virtala et al., 2006). The widespread availability of effective contraceptives that allows women to control their fertility is instrumental in influencing the timing of childbearing and is often considered the strongest influencing factor in the trend towards increased maternal age in the first pregnancy (Best Start, 2007). Desires to experience personal freedom and pursue individual interests can also impact decisions around the timing of

childbearing. For example, some couples may postpone having children so that they may travel or participate in other recreational activities (Best Start, 2007).

Some individuals may postpone having children until they have achieved a well-established career. Canadian women who delay childbirth are at an advantage in the workforce as they are able to accumulate more years of full-time work experience (Health Canada, 2005). As well, many work places are not conducive for individuals to easily combine parenting and work (Best Start, 2007). Longer maternal/parental leave can also influence childbearing decisions. In 2007 the average amount received by Canadian employees for maternity/parental benefits was 55% of average insured earnings up to a maximum of \$432 per week. However, not all women qualify for leave benefits, particularly if they are self-employed or unemployed (Best Start, 2007). Timing of first pregnancy may be influenced as well by the degree of financial security desired before having children. Financial status is influenced by a number of factors including personal income, household income, assets, debts, and re-entering the workforce after having a child. Women who postpone have a family tend to earn at least 6% more than women who have children earlier. Women who leave their careers early to have their first child may not be able to recover economically easily. As well, older first-time mothers may have more assets (i.e., paid for home or car) and less debt (i.e., loans). Today the majority of women in Canada return to work within one to two years of giving birth reflecting the fact that a dual-income is important for families and that they feel satisfaction from both their work and role as a provider (Best Start, 2007). Increases in reproductive technology options for women over the age of 35 who wish to conceive can also influence the timing of childbearing. The average age of women in Canadian ART programs is 38.5 years, and many researchers believe the average age is increasing (Nicholson, 2005). The average age at which women seek ART is largely influenced



by demand and inclusion criteria. For example, as success rates of technologies improve with older women, ART programs adjust their inclusion criteria (Best Start, 2007).

### **1.6.3 Experiences of Delayed Childbearing**

A phenomenological study examining women's experiences of delayed childbearing conducted by Cooke and colleagues in 2012 revealed three main themes: the chapters of life, the need to know, and childbearing being within or beyond women's control. Women in this study cited the need for a stable relationship, being ready to have a baby, and acquisition of life experience as factors which influenced their decision to delay childbearing (Cooke et al., 2012). Overall, the women in this sample believed they did not have ultimate control when it came to the timing of childbearing. Factors such as relationship, financial stability, health and fertility were identified as often being out of the woman's control (Cooke et al., 2012). The researchers conducting this study concluded that delayed childbearing is rarely a conscious choice and timing of childbearing is influenced by an array of factors outside of women's control. They believe that health professionals and the media should be aware of the complexities of women's reasons for delaying childbearing, women may benefit from preconception education, and increasing the understanding of reasons why women delay childbearing will facilitate the provision of more appropriate and sensitive care (Cooke et al., 2012).

Ericksson, Larsson, Svanberg, and Tyden (2013) conducted interviews with highly educated women and men in Sweden and asked them to reflect on their fertility and decision to postpone parenthood. Fertility was perceived as an unconsidered capacity, sometimes unpredictable, different for men and women, and taken for granted. Most participants believed that fertility could be restored with ART or replaced by alternatives to a biological child. Adaptation to societal changes, current discourses of parenthood, and competing priorities of a

contemporary lifestyle were all cited as reasons for postponing parenthood (Ericksson et al., 2013).

### **1.7 Delayed Childbearing Trends**

In Western countries, such the United States, Western Europe, Australia, and New Zealand, there is an increasing trend for individuals to delay childbearing and postpone the timing of a first pregnancy, often past the age of 35 (Lampic et al., 2006; Balasch & Gratacos, 2010; Bretherick et al., 2010; Cooke et al., 2012; Wright, 2011; Virtala et al., 2011; Daniluk et al., 2012; Johnson & Tough, 2012). Particularly in Canada a greater proportion of women are having fewer children and having them later in life (Best Start, 2007). On average first-time mothers in Canada are older than women in other developed countries (Benzies, 2008). While birth rates have been decreasing for Canadian women aged 15-19, they have been increasing for Canadian women aged 30-39 (Health Canada, 2005). As of 2009, of the Canadian mothers who gave birth, 50% were 30 years of age or older, which was two and a half times greater than the percentage in 1974 (Statistics Canada, 2012).

Attempts to explain these trends have received much academic, political, and media attention (Rindfuss & Brauner-Otto, 2008). Postponement of pregnancy, or delayed childbearing, has been identified as a major contributing factor for the lower birth rates in Western countries. Factors in educational systems, labour markets, and housing markets may have inadvertently led to the increased trend to delay childbearing (Rindfuss & Brauner-Otto, 2008). Rindfuss and Brauner-Otto (2008) argue that the following specific factors may lead to the postponement of childbearing: difficult school-to-work transition; difficult re-entry to the labour market; inability to integrate childrearing into a career; difficulty obtaining a mortgage; and difficulties with renting and affording rent.

Many individuals plan on delaying childbearing well past the optimal fertile window. The average age for Canadian women to have their first child was 23.4 years in 1976, 28.0 years in 2003, and currently the average age is 29.4 (Health Canada, 2005; Statistics Canada, 2012). Findings vary within the literature with respect to the reported age at which individuals intend to have their first child and last child. Peterson et al. (2012) found that both men and women wanted to have their last child at the age of 33 years, while Ekelin et al. (2012) found that men and women wanted to be 32 years old when they had their last child. However, there are many individuals who plan on having children much later. Lampic et al. (2006) found that half of women and men in their sample wanted to have their last child between 35 and 39 years, and 12% of women wanted to have their last baby in their 40s. There are certainly many factors involved with decisions to delay childbearing, but a lack of awareness of the age-related decline in female fertility may very likely contribute to this choice (Bretherick et al., 2010). Again, insufficient awareness can lead many people to making uninformed decisions, which could lead them to experience involuntary childlessness.

The increase in maternal age at first birth appears to have become a phenomenon in developed countries particularly in the past two decades. For example, this increase has been evident in many Western countries, including England, Wales, the United States, and Sweden (Lampic et al., 2006; Cooke et al., 2010). In England and Wales the average maternal age at first birth was 25.1 in 1988, 26.8 in 1997, and 27.7 in 2007 (Cooke et al., 2010). In Sweden the average age at first birth was 29 years for women and 31 years for men in 2004, which suggests many couples are postponing childbearing until ages when female fertility and reproductive capacity is lower (Lampic et al., 2006). In the United States first births to women aged 35 and 39 years has increased by 2% annually since 1978 and for women between 40 and 44 years this rate

has increased by more than 70% since 1990 (Cooke et al., 2010). Similarly in Canada more women over the age of 30 years are giving birth and the proportion of first births occurring among women over the age of 30 has increased in the last 20 years (Bushnick & Garner, 2008). In 2008 11% of first births occurred in women who were 35 years of age or older (Bushnick & Garner, 2008).

### **1.7.1 Benefits of Delayed Childbearing**

Many individuals have strong intentions to have children one day in the future but choose to postpone childbearing until they are ready. There are a number of advantages reported for men and women who delay childbearing. Some of the benefits include having established careers with financial security and career-time flexibility, enhanced emotional preparedness, personal development, committed co-parenting relationships, and a positive overall family experience (Lampic et al., 2006; Tyden et al., 2006; Tough et al., 2007; Bretherick et al., 2010; Cooke et al., 2010; Shaw, 2011; Virtala et al., 2011; Johnson & Tough, 2012; Wyndham et al., 2012; Dougall et al., 2012). As previously noted, women who are most likely to delay pregnancy are those with higher education (Lampic et al., 2006; Virtala et al., 2011). Female university students are a group that are very likely to delay childbearing as they pursue professional, academic, and career training (Bretherick et al., 2010). The decision to postpone childbearing may be the result of concerns about the potential negative impact of starting a family on career advancement (Bretherick et al., 2010). Almost one in five women surveyed at an IVF clinic reported the desire for a career as the reason they postponed pregnancy and a similar proportion reported being unaware of the impact of age on fertility (Bretherick et al., 2010). The availability of safe, effective, reversible contraception is also considered a major contributing factor to women delaying childbearing, as it allows women to control when, and if, they become pregnant (Virtala

et al., 2011; Johnson & Tough, 2012). There are also a number of health advantages for waiting to become pregnant after age 35 including increased use of folic acid, more care in planning a pregnancy, better physical health, better psychological preparedness, higher breast feeding rates, and more economic stability (Carolan & Frankowska, 2010). Women who exercise prudent health can actually experience better perinatal and neonatal outcomes (Carolan & Frankowska, 2010).

### **1.7.2 Consequences of Delayed Childbearing and Involuntary Childlessness**

Many women are unaware of the potential consequences of delayed childbearing. Delaying childbearing can potentially lead to a number of negative psychosocial and biophysical consequences, including declining fertility rates, pregnancy complications, and adverse pregnancy outcomes. Women of advanced maternal age are considered to be at a higher risk for experiencing poor maternal and neonatal outcomes (Cleary-Goldman et al., 2005; Cooke et al., 2012; Virtala et al., 2011; Johnson & Tough, 2012; Bayrampour et al., 2012). Other disadvantages of delaying childbearing reported for men and women include unexpected difficulty in conceiving, which can culminate in the use of ART and result in a smaller family than originally desired, lack of energy for parenting, less available lifetime to spend with children; and anticipated stigma as older parents (Dougall et al., 2012).

Intentionally postponing childbearing may also result in involuntary childlessness (Karmon et al., 2011). Distinguishing between voluntary and involuntary childlessness is difficult because more women are delaying childbearing to ages when their chances of conceiving are decreased (Karmon et al., 2011). Involuntary childlessness is traditionally defined as the inability to conceive despite repeated efforts over a period of one year or more, resulting in unanticipated and undesired childlessness (Juries, 2005). Generally it is associated with factors

affecting fertility (e.g., reproductive aging, history of tubal disease) as well as sociocultural and economic factors (e.g., access to healthcare, treatment-seeking behaviour, perceptions of nulliparity) (Karmon et al., 2011). Because medical interventions cannot fully overcome age-related declines in fertility for women, many women are unable to realize their goal of becoming a mother (Koert, 2012). In a qualitative phenomenological study examining women's experience with unintentional childlessness after delaying childbearing and becoming infertile several common themes emerged. The themes identified included: sense of profound grief and loss; sense of powerlessness of not being able to become a mother earlier; feeling devastated with the realization that time had run out to become a mother; sense of being judged by others for not having children earlier; and a sense of being an outsider in the world of other mothers (Koert, 2012).

### **1.8 Need for Educational Improvements Regarding Fertility-Related Issues**

To address the significant lack of awareness regarding fertility and infertility treatments, and trends in delayed childbearing among the general population, many researchers have argued for the need to provide more information on these topics (Rovei et al., 2010; Hashiloni-Dolev et al., 2011; Virtala et al., 2011; Wright, 2011; Ekelin et al., 2012; Johnson & Tough, 2012; Peterson et al., 2012). The provision of information about fertility issues may serve to prevent both fear and unnecessary delays in seeking treatment for those faced with difficulty conceiving (Bunting & Boivin, 2008). Knowledge about sexual health issues may also function to prevent infertility for some individuals, particularly with respect to information regarding sexually transmitted infections, the decline in fertility associated with advanced maternal age (Bunting & Boivin, 2008), the link between advanced maternal age and adverse pre- and post-natal outcomes

(Benzies, 2008), and the limits of reproductive technologies in compensating for the age-related decline in fertility (Balasch & Gratacos, 2010).

Some believe that the responsibility for providing information regarding fertility should fall on schools (Rovei et al., 2010; Hashiloni-Dolev et al., 2011; Virtala et al., 2011; Ekelin et al., 2012). Others say that medical organizations and professionals (e.g., general practitioners, gynaecologists, nurses, midwives, school medical workers, etc.) should bear the responsibility for informing young women, particularly those at the beginning of their reproductive life, about potential concerns like the age-related drop in female fertility (Cooke et al., 2010; Rovei et al., 2010; Virtala et al., 2011; Ekelin et al., 2012). Government bodies, traditional media sources (i.e., newspapers, television, radio stations, magazines, and books), and modern media sources (i.e., Internet and social media) have also been flagged as potential contributors to educational improvement efforts (Lou et al., 2012). These sources have been flagged specifically because government bodies hold the power of setting sex education curriculum standards (Virtala et al., 2011; Ekelin et al., 2012) and the media have the means of disseminating information to the masses (Cooke et al., 2010; Hashiloni-Dolev et al., 2011; Virtala et al., 2011).

However, as previously noted, the impact of education efforts targeting women's intentions to delay childbearing has not yet been examined. Furthermore, the existing literature is based solely on descriptive, atheoretical research that is limited in terms of informing intervention protocols. The link between knowledge and behaviour has been shown to be tenuous in many areas (e.g., giving information regarding the risks of smoking does not result in people quitting smoking) (Masanov & Byrne, 2007). Therefore, simply assuming that information-based interventions will have an impact on individuals' childbearing behaviour may be misguided. The aim of this current research study is to examine the effect of education efforts on targeting

intentions towards delayed childbearing and to incorporate a theoretical framework that explains the connection between individual intentions and behaviour. Specifically, the current research examines intentions held by young women to delay childbearing within the framework postulated by the theory of planned behaviour.

### **1.9 The Theory of Planned Behavior**

The theory of planned behavior (TPB; see Figure 1-1 below) was expanded from the theory of reasoned action (TRA) and designed as a model to predict and explain human behaviour in specific contexts (Ajzen, 1988). According to the theory of reasoned action, people's intentions to perform a behaviour combined with their perceptions of control of the behaviour can predict behavioural performance (Madden, Ellen, & Ajzen, 1992). Across different situations and behaviours both intentions and perceived behavioural control are expected to vary in terms of their ability to predict behaviour (Madden et al., 1992). TPB proposes that there are three conceptually independent determinants of intentions: attitude toward the behaviour; subjective norm; and perceived behavioural control (Madden et al., 1992). Thus, TPB provides a theoretical account of how attitude toward the behaviour, subjective norm, and perceived behavioural control combine to predict behavioural intentions, which subsequently predicts behaviour (Fishbein & Ajzen, 1975; Ajzen & Fishbein, 1980; Ajzen, 1991). The behaviour which is of particular focus to the present study is delayed childbearing. In this line of research I examined how attitudes toward the outcomes of delayed childbearing, subjective norms for delayed childbearing, and perceived behavioural control over delayed childbearing each influence behavioural intentions.

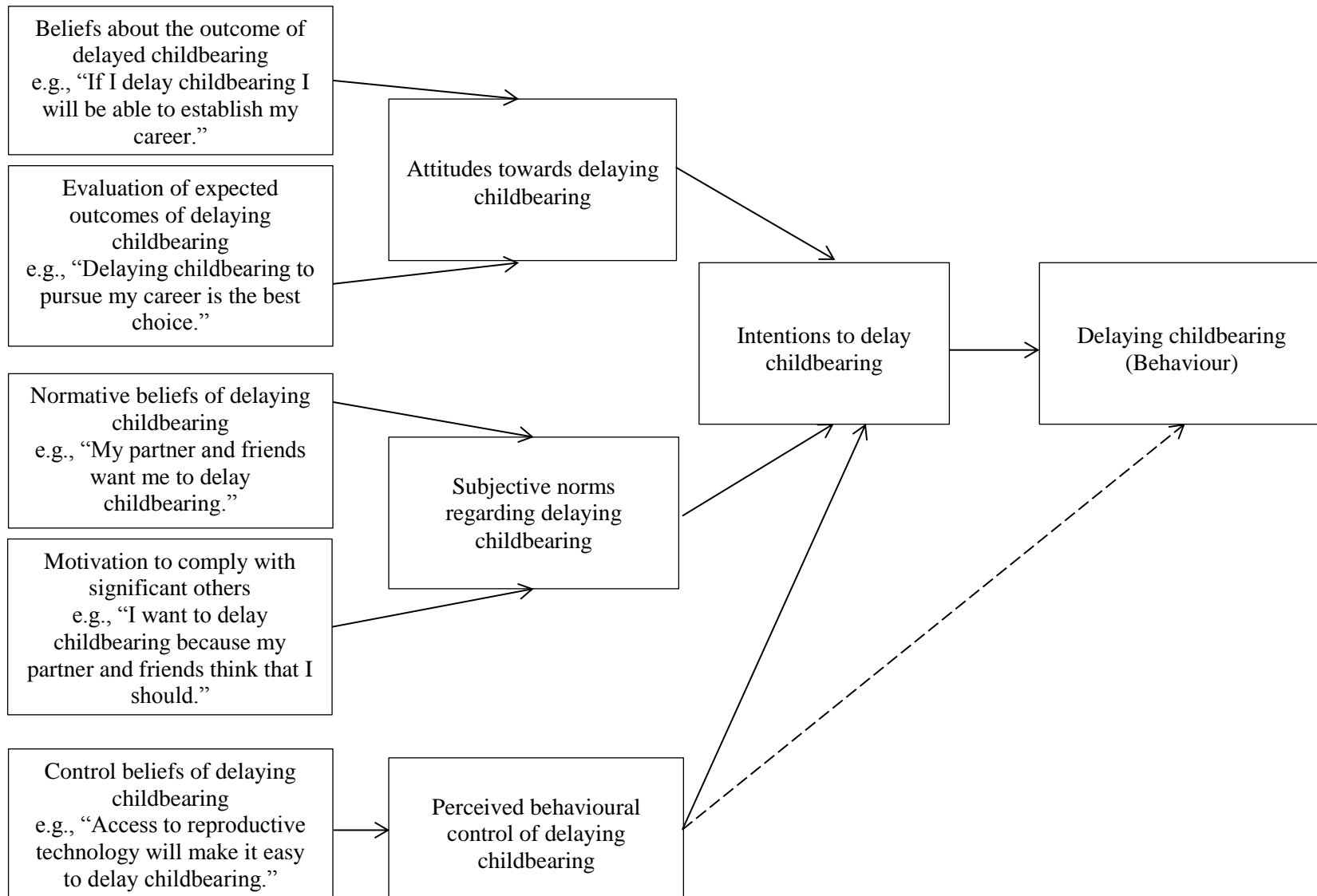


### **1.9.1 Intentions**

A central factor in TPB is an individual's intention to perform a particular behaviour (Ajzen, 1991). Intentions are assumed to reflect the motivational factors that influence an individual's behaviour and are the immediate antecedent to behaviour (Ajzen, 1991). They are also indications of how hard people are willing to try and of how much of an effort they are planning to exert in order to perform a particular behaviour (Ajzen, 1991). For example, the theory would state that the stronger intentions an individual has with regards to delaying childbearing, the more likely they are to delay childbearing. Intentions are predicted by three distinct variables: individual attitude toward the behaviour; subjective norm of behaviour; and level of perceived control over the behaviour (Ajzen, 1991; Ajzen, 2002).

The general rule outlined by TPB is as follows: more favourable attitudes and subjective norms with respect to the target behaviour, in combination with greater perceived behavioural control, should lead to stronger individual intentions to perform the behaviour in question (Ajzen, 1991; Madden et al., 1992; Ajzen, 2011). Further, given an adequate amount of actual control over the behaviour when the opportunity arises, people are expected to act out their intentions (Ajzen, 2011). In general people intend to perform a behaviour when they evaluate it positively, when they experience social pressure to perform it, and when they believe that they have the means and opportunities to do so (Ajzen & Fishbein, 2005). As well it is assumed by TPB that the relative importance of these three theoretical antecedents varies across target behaviours being examined (Ajzen & Fishbein, 2005). The relative weights of the three factors can vary from one person to another or from one population to another, and in some instances only one or two of the factors are required for predicting intentions, while all three factors are important determinants for other intentions (Ajzen & Fishbein, 2005).

Figure 1-1. Delayed childbearing theory of planned behaviour model.



### **1.9.2 Attitudes Toward the Behaviour**

Attitudes are defined as the favourable or unfavourable cognitive and affective beliefs regarding a particular behaviour, and they consist of two parts: an individual's beliefs about the consequences of performing the behaviour and subjective evaluations of the consequences (Ajzen, 2002). The strength of a particular belief ( $b$ ) is weighted by the evaluation ( $e$ ) of the outcome or attribute and the products are then aggregated across beliefs (Ajzen, 1991). The following equation represents this relationship:  $A \propto \sum b_i e_i$ . In the context of the current study the attitudinal component reflects the beliefs regarding the likelihood of specific positive and negative outcomes associated with delayed childbearing and the subjective valence attached to those outcomes. For example, a young woman might think it very likely that delaying childbearing would facilitate her career path and that might be judged as very important to her. As a result this would contribute to a favourable attitude toward delaying childbearing. In contrast, another woman might also believe that delaying childbearing would benefit her career, but a career might not be important to her, resulting in a less favourable attitude toward delaying childbearing. A third woman might not agree that delaying childbearing would facilitate her career regardless of whether or not a career is important to her, again contributing to a less favourable attitude toward delaying childbearing. In essence, according to TPB, a positive attitude toward delaying childbearing would be reflective of subjective beliefs that delaying childbearing would result in more positive outcomes that are important to the individual.

### **1.9.3 Subjective Norms of the Behaviour**

Subjective norm refers to the perceived social pressure from referent individuals or groups (e.g., friends, family, physicians, coworkers, etc.) to perform or not perform a particular behaviour (Ajzen, 2002). While social pressure is generally defined in terms of institutional level

pressures or as rules of conduct which are socially enforced (Gerber, Green, & Larimer, 2008), Ajzen defined social pressure specifically in terms of perceived behavioural expectations of important referent individuals or groups<sup>3</sup>. There are two antecedents which form a subjective norm: 1) the individual's belief about whether significant others feel that he or she should perform the behaviour (i.e., the normative belief), and 2) the individual's motivation to comply with a significant other's preference (Ajzen, 1991). The strength of the normative belief (n) is weighted by the individual's motivation to comply (m) with the referent in question, and the products are then aggregated (Ajzen, 1991). The following equation represents this relationship:  $SN \propto \sum n_i m_i$ . For current study the subjective norm component reflects the beliefs regarding the likelihood of specific referent groups thinking that an individual should delay childbearing and the individual's motivation to comply with those referent groups. For example, a young woman might perceive it to be very likely that her mother prefers she delaying childbearing and she feels very motivated to comply with her mother. As a result this would contribute to the young woman feeling greater social pressure to delay childbearing. In contrast another woman might also perceive it to be very likely that her mother prefers she delay childbearing, but she does not feel very motivated to comply with what her mother prefers resulting in a less perceived social pressure to delay childbearing. A third woman might perceive it to be very unlikely that her mother would prefer her to delay childbearing regardless of whether or not she feels motivated or unmotivated to comply with her mother's preference, again contributing to less social pressure to delay childbearing. In sum, according to TPB, a greater subjective norm (or social pressure) to delay childbearing would be reflective of subjective beliefs that a particular referent group would strongly approve of delaying childbearing and the individual is highly motivated to comply with the referent group.

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<sup>3</sup> In the current study social pressure will be defined as outlined by Ajzen.

#### **1.9.4 Perceived Behavioural Control over the Behaviour**

Perceived behavioural control is the extent to which a person feels able to enact a particular behaviour and is assumed to reflect past experience as well as anticipated impediments and obstacles to the behaviour (Ajzen, 2002). There are two aspects to the level of perceived control an individual might perceive: 1) how much a person believes they have control over the behaviour, and 2) how confident a person feels about being able to perform or not perform the behaviour (Ajzen, 1991). The strength of each control belief ( $c$ ) is weighted by the perceived power ( $p$ ) of the control factor, and the products are aggregated (Ajzen, 1991). This relationship is represented by the following equation:  $PBC \propto \sum c_i p_i$ . For the purposes of the current study the perceived behavioural control component reflects the beliefs regarding the likelihood of an individual having access to or possessing specific control factors and the subjective level of facilitative or inhibitive power the control factors provide the individual with respect to delayed childbearing. For example, a young woman might think it very likely that fertility treatments will be successful in helping her to become pregnant if she has difficulties in the future and having access to successful fertility treatments would make it easier for her to delay childbearing. As a result this would contribute to a greater level of perceived control over delayed childbearing. In contrast another woman might also believe that fertility treatments will be successful in helping her to become pregnant if she has difficulties in the future, but having access to successful fertility treatments would not make it easier for her to delay childbearing. This would result in lower perceived control over delayed childbearing. A third woman might not believe that fertility treatments will be successful in helping her to become pregnant if she was having difficulties in the future regardless of whether or not having access to successful fertility treatments would make it easier for her to delay childbearing. This would also contribute to a lower level of

perceived control over delayed childbearing. In essence, according to TPB, a greater level of perceived control over delaying childbearing would be reflective of the high likelihood of a factor being both present and highly facilitative with respect to delayed childbearing.

A final note on perceived behavioural control is warranted. As previously stated, TPB assumes that intentions are the immediate antecedent of behaviour (Ajzen, 2011). Because much behaviour can be difficult to actually execute, thus limiting voluntary control, TPB considers perceived behavioural control in addition to intentions for predicting behavioural achievement (Ajzen, 1991; Ajzen, 2011). Explicit perceived behavioural control can actually serve as a proxy for actual control and increase the prediction of a particular behaviour (Ajzen, 2011). Thus perceived behavioural control can have a direct influence on behaviours as well as an indirect influence via its influence on intentions.

### **1.9.5 Behavioural, Normative, and Control Beliefs**

As previously noted, TPB is designed to explain and predict behaviour. TPB posits that behaviour is a function of beliefs relevant to the behaviour (Madden et al., 1992). People can hold many beliefs about a particular behaviour, but they can only attend to a small number of beliefs at one time (Madden et al., 1992). These salient beliefs are considered to be the prevailing determinants of a person's intentions and actions (Madden et al., 1992). TPB distinguishes three kinds of salient beliefs: beliefs about the likely consequences of the behaviour (behavioural beliefs); beliefs about the normative expectations of others (normative beliefs); and beliefs about the presence of factors that may further or hinder performance of the behaviour (control beliefs) (Ajzen, 1991). Behavioural beliefs are those that underlie a person's favourable or unfavourable attitude towards a particular behaviour and are mediated by the perceived outcomes of the behaviour (Ajzen, 2002). Normative beliefs are those concerned with the likelihood that salient

referent individuals or groups (e.g., friends, family, peers) would approve or disapprove of a particular behaviour and are mediated by an individual's motivation to comply with these normative expectations, or perceived social pressure (Madden et al., 1992; Ajzen, 2002). Control beliefs are determined by the perceived presence or absence of necessary resources or opportunities, and are mediated by the perceived ease or difficulty the resource or opportunity would result in for performing the behaviour (Ajzen, 2002; Ajzen, 2011). Theoretically the combination of behavioural beliefs and outcome evaluations, normative beliefs and motivation to comply, as well as control beliefs and perceived power all form the distal basis for behavioural intentions by comprising the building blocks for attitudes, subjective norms, and perceived behavioural control, respectively (Ajzen, 2002).

#### **1.9.6 Behavioural Interventions Based on TPB**

The theory of planned behavior is generally used as a framework for developing, testing, and evaluating interventions targeting behaviour change (Ajzen, 2002). For example, TPB is one of the most widely used models for safer sex campaigns (Yzer, Siero, & Buunk, 2000). Specifically, it has been used to identify predictors of AIDS preventive behaviours, delaying sexual initiation, and safer sex intentions and behaviours (Yzer et al., 2000). It has also been used to explain intentions to engage in premarital sex (Cha, Doswell, Kim, Charron-Prochownik, & Patrick, 2007), for evaluating peer education programs on postponing sexual intercourse (Caron, Godin, Otis, & Lambert, 2004), and for examining beliefs, attitudes, norms, and intentions contributing to the use of contraceptive methods to prevent STIs (Dye, Stanford, Alder, Kim, & Murphy, 2005).

As previously discussed, TPB posits that behavioural intention is determined by attitude towards the behaviour, subjective norm of the behaviour, and perceived control over the

behaviour (Ajzen, 1991), which in turn are determined by behavioural beliefs, normative beliefs, and control beliefs respectively (Ajzen, 2002). Behavioural interventions must try to change the beliefs that ultimately guide performance of a target behaviour because attitudes, subjective norms, and perceived behavioural control are assumed to be based on corresponding sets of beliefs (Ajzen, 2011). As such, interventions designed to change behaviour can be directed at one or more of the determinants of behaviour: attitudes, subjective norms, or perceptions of behavioural control (Ajzen, 2011). According to the TPB model the appropriate means to modify attitudes, subjective norms, or perceived control would be to target the basic individual beliefs that underlie these theoretical components. In order for behavioural interventions to be effective, they must change the behavioural, normative, and control beliefs, which according to TPB, guide the performance of the specific behaviour in question (Fishbein & Ajzen, 2010).

Standard practice in TPB research and when designing behavioural interventions is to first derive the salient behavioural, normative, and control beliefs in order to formulate items to include in a TPB questionnaire (Fishbein & Ajzen, 2010). This is achieved by having a small sample of individuals who are representative of the research population complete a pilot questionnaire to elicit salient behavioural outcomes, normative referents, and control factors associated with the target behaviour (Fishbein & Ajzen, 2010). Direct measures of attitude toward the behaviour, perceived norm, and perceived behavioural control are also derived from this pilot questionnaire to create items for the main TPB questionnaire (Fishbein & Ajzen, 2010). For the final TPB questionnaire items are formulated to assess the following elements: behavioural beliefs and outcome evaluations; normative beliefs and motivation to comply; control beliefs and power of control factors; and direct measures of attitude, subjective norm, perceived control, and intention (Ajzen, 2011).



Once the TPB questionnaire is formulated it is administered to a representative sample of the population under consideration (Fishbein & Ajzen, 2010). Measuring the various components of the TPB allow researchers to gain insight into the attitudinal, normative, and control factors which determine intentions and thus behaviour (Fishbein & Ajzen, 2010). By examining the specific behavioural, normative, and control beliefs that discriminate between individuals inclined and disinclined to perform the behaviour of interest, one can gain the most detailed and substantive information to guide the development of an intervention (Fishbein & Ajzen, 2010).

Interventions designed to change behaviour can be designed to target attitudes, subjective norms, and/or perceptions of behavioural control (Ajzen, 2011). Because these determinants of behaviour are assumed by TPB to be based on corresponding sets of beliefs, behavioural interventions should specifically target changing the beliefs that ultimately guide behaviour (Ajzen, 2011). TPB provides general guidelines for developing effective interventions, but it cannot predict what kind of intervention will be most effective (Ajzen, 2011). Formative research helps determine if behavioural, normative, and/or control beliefs can be changed and can also determine their relative weights in the prediction of intentions and behaviour (Ajzen, 2011). As previously noted, the relative weights of behavioural, normative, and control beliefs can vary depending on the target behaviour and population (Ajzen & Fishbein, 2005). In general, if a given factor has a greater relative weight then it is more likely that changing that factor will influence intentions and behaviour (Ajzen, 1971).

Attitudes tend to hold the strongest weight in determining intentions (Haggar, Chatzisarantis, & Biddle, 2002; Fife-Shaw, Sheeran, & Norman, 2007; French & Cooke, 2012). Subjective norms have been found to adequately predict intentions in studies related to behaviours such as binge drinking (French & Cooke, 2012) and alcohol use (Glassman, Braun,

Dodd, Miller, & Miller, 2010). In other studies though the relative weight of subjective norms in determining intentions was found to be weaker than attitudes or perceived behavioural control for target behaviours such as health behaviours, physical activity, and social behaviours (Armitage & Conner, 2001; Hagger et al., 2002; Fife-Shaw et al., 2007). The pattern of findings for the weight of perceived behavioural control in determining intentions is also mixed with some studies examining health behaviour, consumer behaviour, and smoking behaviour showing it to be an adequate predictor of intentions and behaviour (Armitage & Connor, 2001; Sheeran, 2002; Smith, Manstead, Terry, & Louis, 2007; Bricker, Peterson, Sarason, Andersen, & Rajan, 2007) and others examining physical activity, motivation to consume alcohol, and binge drinking finding it to be less adequate than attitudes and social norms (Hagger et al., 2002; Fife-Shaw et al., 2007; Glassman et al., 2010; French & Cooke, 2012). As stated previously, TPB assumes that the importance of attitude toward the behaviour, subjective norm, and perceived behavioural control partially depends on which target behaviour a particular intervention is examining (Ajzen & Fishbein, 2005). For some target behaviours attitudes might be weighted more and for other intentions subjective norms and perceived behavioural control may be more important (Ajzen & Fishbein, 2005). If attitudes are more predictive for a particular behaviour for a particular population this would suggest that any interventions should focus on attitudinal beliefs. For other behaviours, or other populations, subjective norms might emerge as more salient so they should be the focus of interventions. Again, the relative weights can vary of these three factors can vary within and between individuals and for some intentions only one or two factors are required, while all three factors are important when considering other intentions (Ajzen & Fishbein, 2005). Many researchers examining delayed childbearing trends assume that the way to change the trend is to provide information or change peoples' attitudes. However, subjective norms or

perceived behavioural control may actually be more salient to delayed childbearing intentions. Therefore, any interventions targeting attitudes would not be optimally effective. As such it is important to examine which factor is most predictive of intentions to delay childbearing before informational interventions are developed.

### **1.10 Current Research and Hypotheses**

The purpose of this research study was to investigate the attitudes, subjective norms, and perceived control associated with delayed childbearing amongst young childless women and their respective ability to predict individual intentions to delay childbearing. Many commentators assume the provision of information targeting fertility related issues and ART will be influential in altering women's intentions related to delay childbearing, but there is a lack of empirical and/or theoretical evidence provided to support this assumption. Further, suggestions for how best to provide education related to fertility and ART have not yet been examined. Before educational, government, and/or medical institutions invest effort and money in developing educational initiatives around fertility issues, it would be prudent to more fully understand the extent to which knowledge and cognitively based attitudes are associated with the fertility intentions of young women. The vast majority of university students, despite being the ideal age for childbearing and possessing a strong desire to have biological children, usually intend to delay their reproductive endeavours to a later stage in life. This population is therefore ideal for the sampling purposes of this research as they are at risk for experiencing unintended childlessness as a result of pursuing higher education and postponing childbearing.

There were two overarching goals for this research project. First, given that the majority of previous research examining delayed childbearing has neglected to incorporate a theoretical framework to explain the connections among reproductive knowledge, beliefs, intentions, and

behaviour, I examined whether the theory of planned behavior could be applied for predicting women's intentions to delay childbearing. Second, given that the impact of information provision on young women's decisions regarding delayed childbearing has not yet been investigated, I examined if the provision of detailed, accurate, and accessible information regarding reproduction, factors influencing fertility, and the limitations of fertility treatments would alter individual attitudes and levels of perceived control surrounding delayed childbearing.

Using TPB (Ajzen, 1991) as the theoretical framework I examined the attitudes young women have regarding delaying childbearing, the subjective norms young women perceive from significant others regarding delayed childbearing, and the perceived control young women have regarding delaying childbearing. Further, I examined the relative ability of these three constructs (attitudes, subjective norms, and perceived control) to predict individual intentions to delay childbearing. My specific hypotheses were as follows:

- 1) Testing the applicability of the TPB: I predicted that the theory of planned behavior would provide an adequate framework for examining women's intentions to delay childbearing in that attitudes, subjective norms, and perceived control would all emerge as significant predictors of these intentions. The following are the specific hypotheses relating to each of these constructs.
  - a. More positive attitudes towards delayed childbearing will be associated with greater intentions to delay childbearing.
  - b. Higher social normative endorsement of delayed childbearing will be associated with greater intentions to delay childbearing.
  - c. Greater levels of perceived control over delayed childbearing will be associated with greater intentions to delay childbearing.

- d. Attitudes toward delayed childbearing will emerge as the most significant unique predictor of intentions to delay childbearing. This is based upon both the previous research that has concluded that attitudes are often the most salient predictor of intentions across behavioural domains (Hagggar et al., 2002; Fife-Shaw et al., 2007; French & Cooke, 2012), and the current assumption that misguided attitudes are driving the trend to delayed childbearing (Rovei et al., 2010; Hashiloni-Dolev et al., 2011; Virtala et al., 2011; Wright, 2011; Ekelin et al., 2012; Johnson & Tough, 2012; Peterson et al., 2012).
- 2) Examining the impact of information provision: I predicted that the provision of detailed, accurate and accessible information regarding reproduction, factors influencing fertility, and the limitations of fertility treatment would alter young women's intentions to delay childbearing. These hypotheses are based on the current literature examining delayed childbearing trends and the lack of fertility awareness among the general population (Lampic et al., 2006; Balasch & Gratacos, 2010; Bretherick et al., 2010; Cooke et al., 2012; Wright, 2011; Virtala et al., 2011; Daniluk et al., 2012; Johnson & Tough, 2012). Many commentators assume that the provision of information related to fertility will change people's behaviour with respect to delayed childbearing (Rovei et al., 2010; Hashiloni-Dolev et al., 2011; Virtala et al., 2011; Wright, 2011; Ekelin et al., 2012; Johnson & Tough, 2012; Peterson et al., 2012). Yet a theoretical model has not been suggested to explain how the provision of information can change behaviour. The second aim of the current study is to apply a theoretical framework to substantiate the claims within the literature. TPB posits that changing behaviour can be accomplished through interventions which target changing attitudes, subjective norms, and/or perceived control (Ajzen, 2011). Commentators posit that cognitively based information should be provided to the general public regarding delayed

childbearing. Thus in the present study the intervention will focus on providing information that targets primarily the cognitive components of attitudes, and to a lesser extent the cognitive basis of perceived control. Suggestions for the breadth of information to provide have not included information related to subjective norms. As such, subjective norms will not be targeted in the current study. The following are the specific hypotheses relating to this general inquiry:

- a. Provision of cognitively based information will result in lower intentions to delay childbearing for the fertility information group compared to the alcohol information group.
- b. Provision of cognitively based information will result in less perceived control over delayed childbearing for the fertility information group compared to the alcohol information group.
- c. Provision of cognitively based information will have no impact on the levels of social normative endorsement of delayed childbearing for both the fertility information and alcohol information groups.
- d. Provision of cognitively based information will result in less positive attitudes toward delayed childbearing for the fertility information group compared to the alcohol information group.

## CHAPTER 2 PRINCIPAL STUDIES

### 2.1 Study 1 – Elicitation Phase

#### 2.1.1 Purpose

As recommended by Ajzen (1991; Fishbein & Ajzen, 2010) elicitation research was conducted prior to the main TPB study in order to identify the salient beliefs in the target

population regarding delaying childbearing. As previously outlined, before undertaking TPB research or designing a behavioural change intervention based on TPB pilot work is required to identify the salient behavioural, normative, and control beliefs present within the target population. Because these beliefs form the basis for the attitudes, subjective norms, and perceived behavioural control that ultimately predicts behaviour, these beliefs are the target of TPB behavioural interventions (Ajzen 2011). In order to identify the salient beliefs about a particular behaviour among a target population, respondents should be given a description of the behaviour in question and then asked a series of questions designed to elicit the beliefs. After identifying the salient beliefs, a standard TPB questionnaire can be created to measure the main theoretical constructs based upon the elicited beliefs, which is then administered to a sample composed of individuals from the target population. The final TPB questionnaire should include direct measures of attitudes, subjective norms, perceptions of behavioural control, intentions (Ajzen, 2011). The questionnaire also assesses behavioural beliefs, normative beliefs, and control beliefs. Measuring these beliefs is said to provide insight into why people hold certain attitudes, subjective norms, and perceptions of behavioural control. In sum, the beliefs provide a glimpse of the underlying cognitive foundation of a particular behaviour in a given population at a given point in time.

### **2.1.2 Participants and Procedure**

Twenty-five female undergraduate participants were recruited from the Psychology Participant Pool at the University of Saskatchewan. Specifically, young childless women were targeted for recruitment for a number of reasons. These individuals are at the beginning of the reproductive phase of their lives and are starting to make decisions which may impact their decisions about the timing of childbearing (i.e., pursuing a university education). This sample is

also appropriate because empirical evidence shows that more highly educated individuals intend to have more children, tend to revise their fertility intentions downwards more easily, and are more likely to delay having children (Toulemon & Testa, 2005; Lampic et al., 2006; Virtala et al., 2011). Therefore, investigating the delayed childbearing intentions of women from this age group is essential as they are most in need of an informational intervention. As well, much of the educational materials regarding fertility and assisted reproductive technology (ART) are directed at women. This population will also be the main target for the TPB study described below.

Participant recruitment was conducted through the use of the University of Saskatchewan Psychology Participant Pool website (<http://usask.sona-systems.com>) as well as with advertisements posted on campus and on the Personalized Access to Web Services (PAWS) website bulletin page. Participants could sign up for the study after reading a brief description of the study posted on the Psychology Participant Pool website (Appendix A) then choosing a convenient date and time for the group testing session. Participants received one bonus mark toward their final grade in Psychology 110 for their participation. Participants recruited through advertisements placed on campus and through PAWS contacted the student-researcher and arranged to meet at a convenient time on campus. The study description included information regarding the study purpose and details of participation. Study sessions were run by the researcher. Ethics approval for this research was granted by the University of Saskatchewan Behavioural Research Ethics Board on March 1, 2013 (Appendix B).

Each study session accommodated a minimum of 1 and a maximum of 10 participants in a testing room in the Psychology Department. The room was large enough that the maximum amount of participants could complete the questionnaire with enough personal space around them to afford privacy. The researcher began each session by describing the purpose and



procedures of the study. It was reiterated to participants that the topics may be sensitive to some, and that they should feel free to withdraw their participation, or to not answer any questions that made them feel uncomfortable. Participants were then given a consent form (Appendix C) that they were asked to read. To maintain anonymity, consent was implied and participants were not required to sign the consent form. Participants kept a copy of the consent form for their records. All consent forms were stored separately from completed questionnaires to further ensure anonymity of the data.

Subsequent to providing written consent, participants were given a survey consisting of 14 questions regarding their reproductive intentions, personal beliefs of delaying childbearing, normative beliefs of delaying childbearing, and perceived behavioural control of delaying childbearing (Appendix D). Questions were open-ended so as to not constrain participant responses and to ensure that the beliefs most salient within this target group were being elicited. As our goal was to describe the most salient beliefs of young, childless women, women who had children and men were removed before analyses were conducted. Upon completion of the survey participants submitted the questionnaire, which contained no identifying information, to the researcher. Following this, each participant received a debriefing form (Appendix E) and the student-researcher went through the main debriefing details with the participants and asked if they had any questions or concerns regarding the study. Credits for participation were assigned via the Psychology Participant Pool website to those recruited via this method by the researcher once each data collection session was completed.

### **2.1.3 Analyses**

A content analysis was conducted in order to identify the salient beliefs among the sample of young childless women. The following steps were taken by the student-researcher: all

of the responses provided by participants were summarized and typed; responses were read and summary notes were made regarding relevant information; notes made by the student-researcher were coded and categorized into major themes; and finally, the main themes which emerged were summarized in a table. A copy of the participant responses, the coding scheme, and table of main themes were given to a psychology research colleague from the University of Saskatchewan who independently coded the information. SPSS software was used to conduct inter-rater reliability and calculate Cohen's kappa (index of reliability).

#### **2.1.4 Results**

A total of 29 themes and 6 main categories were identified. The categories included the following: advantages of delaying childbearing and disadvantages of delaying childbearing (attitudinal beliefs regarding delayed childbearing); significant others who would approve and disapprove of delaying childbearing (subjective norm beliefs regarding delayed childbearing); and factors which would make it easier or difficult to delay childbearing (perceived control beliefs regarding delayed childbearing). Table 2-1 includes the emergent behavioural themes, Table 2-2 includes the emergent normative themes, and Table 2-3 includes the emergent control themes. The themes that emerged were used to develop the theory of planned behaviour questionnaire measuring individual attitudes, subjective norms<sup>4</sup>, and perceived control of delayed childbearing. In addition to the themes which emerged from the elicitation study, we also used themes derived from previous literature which were shown to be associated with intentions to become pregnant (Robertson-Frey, 2005).

The inter-rater reliability kappa and significance values are included for each theme listed in the tables. Kappa values provide a quantitative measure of the magnitude of agreement

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<sup>4</sup> As previously noted, subjective norm (or social pressure) refers to perceived pressure from significant referent others (e.g., parents, friends, and coworkers).

between raters (Viera & Garrett, 2005). Higher agreement denotes a greater level of reliability (Viera & Garrett, 2005). This value is calculated based on the difference between the actual level of agreement compared to how much agreement would be expected by chance alone (Viera & Garret, 2005). Therefore, a kappa of one indicates perfect agreement between raters while a kappa of zero indicates agreement equivalent to chance (Viera & Garret, 2005). In general, a kappa value of 0.0 would be considered poor, .20 slight, .40 fair, .60 moderate, .80 substantial, and 1.0 perfect (Cohen, 1960). The themes included in the TPB questionnaire were those with moderate, substantial, or perfect kappa values as these indicated a greater degree of agreement between the raters, and thus greater reliability. In sum, the items created for the TPB questionnaire were derived from the emergent themes which had the highest levels of reliability.

Table 2-1. Inter-rater reliability values of emergent behavioural outcome themes

Behavioural Themes	Kappa value
Advantage: Having financial stability	1.00**
Advantage: Having career stability	1.00**
Advantage: Having a stable relationship	.91**
Advantage: Having life experience	.92**
Advantage: Having emotional and cognitive maturity	.91**
Disadvantage: Potential health risks	.65*
Disadvantage: Having less energy	.69**

*Note.* \* $p=.001$ , \*\* $p<.001$

Table 2-2. Inter-rater reliability values of emergent normative outcome themes

Normative Themes	Kappa value
Approval of parents and family	1.00**
Approval of spouse/husband	1.00**
Approval of friends	1.00**
Disapproval of parents and family	.92**
Disapproval of friends	.78**
Disapproval of health professionals	.88**

*Note.* \*p=.001, \*\*p<.001

Table 2-3. Inter-rater reliability values of emergent control outcome themes

Control Themes	Kappa value
Easier: Wanting financial stability	.84**
Easier: Wanting relationship stability	1.00**
Difficult: Health concerns	.92**
Difficult: Relationship pressure	.92**
Difficult: Desire for a child	.80**

*Note.* \*p=.001, \*\*p<.001

## 2.2 Study 2 - Theory of Planned Behaviour in the Context of Intentions to Delay

### Childbearing

#### 2.2.1 Purpose

There were two main goals for this study. The first goal was to examine whether the theory of planned behavior could be applied for the prediction of intentions to delay childbearing. The second goal was to examine if the provision of detailed, accurate, and accessible information regarding reproduction, factors influencing fertility, and limitations of fertility treatments would alter individual attitudes and levels of perceived control associated with delayed childbearing.

### 2.2.2 Participants and Procedure

Sixty-nine female undergraduate students were recruited through the use of the University of Saskatchewan Psychology Participant Pool website (<http://usask.sona-systems.com>) as well as with advertisements posted on campus and on the Personalized Access to Web Services (PAWS) website bulletin page (<https://paws.usask.ca/cp/home/displaylogin>). In order to avoid measuring attitudes, subjective norms, perceived behavioural control, and intentions regarding delaying childbearing that were influenced by the actual experience of childbearing, data were screened to remove those individuals who had children. The data were also screened to remove males who had participated in the study. Additional sample characteristics can be found in Table 2-4.

Table 2-4. Sample personal and reproductive demographics

Variable	Mean	Std. Deviation
Age intended first child	27.78	3.32
Age intended last child	32.31	3.10
Desired number of children	2.69	0.85
Pregnancy importance	4.13	1.10
ART use intentions	3.72	1.25
Current age (years)	21.01	3.70

*Note.* Pregnancy importance scores ranged from 1-5, with higher scores indicating a greater degree of importance to become pregnant. Intentions to use ART scores ranged from 1-5, with higher scores indicating a greater likelihood of using ART if conception difficulties are experienced in the future.

Participants could sign up for the study after reading a brief description of the study posted on the Psychology Participant Pool website (Appendix F) then choosing a convenient date and time for the group testing session. Participants received one bonus mark toward their final grade in Psychology 110 for their participation. Participants recruited through advertisements

placed on campus (Appendix G) and through PAWS (Appendix H) contacted the student-researcher and arranged to meet at a convenient time on campus. The study description included information regarding the study purpose and details of participation. Study sessions were run by the author. Ethics approval for this research was granted by the University of Saskatchewan Behavioural Research Ethics Board on March 1, 2013 (Appendix I). An amendment for participant recruitment and compensation was granted ethical approval on April 1, 2013 (Appendix J).

Each study session accommodated a minimum of one and a maximum of ten participants in a testing room in the Psychology Department. The room was large enough that the maximum amount of participants could complete the questionnaire with enough personal space around them to afford privacy. The researcher began each session by describing the purpose and procedures of the study. It was reiterated to participants in both study conditions that the topics may be sensitive to some and that they should feel free to withdraw their participation, or to not answer any questions that made them feel uncomfortable. Participants were then given a consent form (Appendix K) that they were asked to read and sign if they wished to participate. Participants kept a signed copy of the consent form for his or her records. All consent forms were stored separately from completed questionnaires in order to ensure anonymity of the data.

Sessions were randomly assigned to one of the two intervention conditions (fertility information condition, alcohol information condition). Random assignment ensures that any difference found between the treatment group and the control group is due to chance alone, and not due to selection bias (Mitchell & Jolley, 2012). Subsequent to providing written consent, participants in both groups were asked to watch one of two 5-minute Powerpoint presentations. Depending on which condition the participants were randomly assigned to they watched the

fertility-related information intervention (experimental group; Appendix L) or the alcohol-related information intervention (control group; Appendix M). Then each participant completed the 20-minute self-administered TPB questionnaire (Appendix N-U). Upon completion of the survey, participants submitted the questionnaire, which contained no identifying information, to the researcher. Following this, each participant received a debriefing form (Appendix V) and the researcher went through the main debriefing details with the participants and asked if they had any questions or concerns regarding the study. Specifically, participants were informed of the purpose and hypotheses of the study and it was revealed that there were two different Powerpoint presentations. Participants were given the opportunity to see the Powerpoint presentation that they did not originally view. Credits for participation were assigned via the Psychology Participant Pool website to those recruited via this method by the student-researcher once each data collection session was completed. Participants recruited through advertisements each had their name put into a draw for \$100 after providing their name and contact information to the student-researcher. Names and contact information were stored separately from completed questionnaires and consent forms.

#### **2.2.2.1 Fertility information (treatment) condition**

Participants in the fertility information condition ( $n = 35$ ) were shown a 5-minute Powerpoint presentation (Appendix L) which provided information related to fertility and ART. More specifically, the presentation outlined fertility-related facts (i.e., the age-related decline in female fertility, infertility, the low success rates of ART, and the cost of ART). The presentation focused largely on information that researchers believe should be targeted with interventions since knowledge levels on these topics are low among the general population (Rovei et al., 2010;

Hashiloni-Dolev et al., 2011; Wright, 2011; Virtala et al., 2011; Ekelin et al., 2012; Johnson & Tough, 2012; Peterson et al., 2012; Daniluk et al., 2012).

#### **2.2.2.2 Alcohol information (control) condition**

Participants in the alcohol information condition ( $n = 34$ ) were shown a 5-minute Powerpoint presentation (Appendix M), which provided information on alcohol-related facts (e.g., student drinking, binge drinking, drinking and driving, and alcohol dependence). Alcohol-related facts were chosen for the control group intervention as alcohol consumption is related to personal health and well-being (as is fertility) and is not considered to be a factor which negatively impacts female fertility or reproduction (Tolstrup et al., 2003; Bunting & Boivin, 2008).

#### **2.2.2.3 Rationale for methodology**

The methodology chosen for the current study is a between subjects experimental design. True experimental designs are required in order to demonstrate causality or that a change in the independent variable has produced a change in the dependent variable (Mitchell & Jolley, 2012). A between subjects experimental design randomly assigns participants to each condition (i.e., experimental or control condition) then introduces a treatment intervention for the experimental group (Mitchell & Jolley, 2012). The procedure of randomly assigning individuals to groups ensures that the two groups are equal on individual differences, or potential confounds, before the independent variable is introduced (Mitchell & Jolley, 2012). Including both an experimental group and a control group makes it possible to assess the true effects of an intervention because then any difference between the two groups following the intervention could be attributed to the intervention, as long as possible confounds are controlled (Mitchell & Jolley, 2012). To keep the two conditions as similar as possible, and to control potential confounds, the control group also



receives an intervention (or an alternate level of the independent variable) that is similar to the experimental intervention as possible in all aspects of process (Mitchell & Jolley, 2012).

Between subjects experimental designs are preferable to single group pre-post intervention designs (where one group of participants experiences the experimental level of the independent variable and their pre-study scores on the dependent variable are compared with their post-study scores) in that the latter are vulnerable to specific threats to internal validity such as testing effects and hypothesis guessing on the part of participants (Mitchell & Jolley, 2012).

### **2.2.3 Materials**

#### **2.2.3.1 Manipulation check – intervention questions**

A manipulation check is conducted to assess how the participants perceived and interpreted the experimental manipulation (Gravetter & Forzano, 2011). Specifically, it measures whether the independent variable was manipulated as intended (Gravetter & Forzano, 2011). One way to check the manipulation is to include specific questions about the manipulation in the questionnaire that participants complete after taking part in the experiment (Gravetter & Forzano, 2011). For the present study four questions relevant to the experimental manipulation were included in the main TPB questionnaire completed by the participants in each study group (Appendix W). The questions were developed directly from the content presented in the fertility-related facts presentation. Specifically, these questions asked participants to identify via multiple choice format: (1) the biologically optimum age to have children, (2) the age at which female fertility begins to decline, (3) the approximate costs of IVF per cycle, and (4) ART success rates for women over the age of 42. If the informational manipulation was successful, it is expected that the participants who received the fertility related information would exhibit more knowledge on those questions than those who received the alcohol related information.

### **2.2.3.2 Theory of planned behaviour questionnaire**

The majority of the questionnaire was designed to measure the components of the theory of planned behaviour in the context of individual intentions to delay childbearing. These questions were developed from the information obtained from the elicitation phase of this research as well as from drawing upon research related to beliefs of delaying childbearing. In order to determine what factors may influence one's decision to delay childbearing, the survey contained separate sections pertaining to attitudes towards the outcomes of delayed childbearing, the subjective norms of important, salient others regarding delayed childbearing, perceived control regarding delayed childbearing, as well as individual intentions to delay childbearing. Please see Appendix X for tables listing response frequencies for the TPB component survey items.

**2.2.3.2.1 Direct measures of attitudes, subjective norms, and perceived behavioural control.** Direct measures of the main theoretical constructs encompassed by TPB were developed based on the pilot data collected during the elicitation phase of this research. The direct measures include: attitudes (overall evaluation of a specific behaviour); subjective norms (overall evaluation that significant others would prefer an individual engage in the target behaviour); and perceived behavioural control (overall evaluation of control-related perceptions of the target behaviour) (Bamberg, Ajzen, & Schmidt, 2003). These direct measures are assumed to be more strongly associated with outcomes than indirect measures (Bamberg et al., 2003).

**2.2.3.2.2 Direct measure of attitudes toward delayed childbearing.** Attitudes toward delayed childbearing were directly measured via an 11-item measure consisting of descriptor dyads (Appendix N). Participants were asked to read the statement "Waiting to become pregnant for the first time until after the age of 30 would be..." and then they were asked how they would

rate delayed childbearing on each of the 11 descriptor dyads on a 7-point scale. The 7-point scale was anchored at each end of the continuum by one member of each bipolar descriptive dyad such that 1 represented one extreme end of the continuum and 7 the opposite extreme end of the continuum. Example descriptor dyads include *unpleasant-pleasant*, *beneficial-harmful*, and *worthless-valuable*.

The average of the summed individual items was calculated to create a composite score measuring direct attitudes. However, prior to this calculation five items were reverse coded to ensure that higher scores on these items reflected more positive attitudes towards delayed childbearing (see Appendix Q). The final composite score for direct attitudes towards delayed childbearing therefore, had a possible range from 1-7 where higher scores reflect more positive attitudes towards delayed childbearing. The internal consistency index ( $\alpha = .87$ ) indicated sufficient reliability.

**2.2.3.2.3 Direct measure of subjective norms of delayed childbearing.** Subjective norms of delayed childbearing were directly measured using four items (Appendix O). Each item was constructed to target aspects of perceived social pressure to delay childbearing (e.g., Most people who are important to me think I should delay motherhood). Participants were asked to indicate their level of agreement with each normative statement on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*).

The average of the summed individual items was calculated to create a composite score measuring direct subjective norms. The final composite score for direct subjective norms of delayed childbearing therefore, had a possible range from 1-7, where higher scores reflect higher perceived norms regarding delayed childbearing. The internal consistency index ( $\alpha = .80$ ) indicated sufficient reliability.

**2.2.3.2.4 Direct measure of perceived control over delayed childbearing.** Perceived control over delayed childbearing was directly measured using four items (Appendix P). Each item was constructed to target the extent to which participants believed that delayed childbearing is within their control (e.g., I am confident that if I wanted to delay motherhood I could). Participants were asked to indicate their level of agreement with each statement on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*).

The average of the summed individual items was calculated to create a composite score measuring direct perceived control. Two items were reverse coded to ensure that higher scores on these items reflected greater perceived control. The final composite score for direct perceived control over delayed childbearing had a possible range from 1-7, where higher scores reflect greater perceived control regarding delayed childbearing. The initial internal consistency index ( $\alpha = .65$ ) was not sufficient to justify the use of this composite measure. Item analyses revealed that removal of one item (Whether or not I delay motherhood is completely up to me) increased the internal consistency to a satisfactory level. It is likely that participants were considering their future spouse/partner when responding to this item and this influenced perceptions of control. This item was therefore removed from the composite score and the resulting internal consistency index was  $\alpha = .73$ .

**2.2.3.2.5 Indirect (belief based) measures of TPB components (Appendix Q-S).**

Indirect measures of the minor theoretical constructs that comprise the major constructs encompassed by TPB were also developed with information gathered during the elicitation phase of this research. The indirect measures include: behavioural beliefs (assumed to influence attitudes toward the behaviour); normative beliefs (constitute the underlying determinates of

subjective norms); and control beliefs (provide the basis for perceptions of behavioural control (Ajzen, 1991).

**2.2.3.2.6 Belief based attitudes towards delayed childbearing.** Ten items were constructed to tap into the participant's beliefs and evaluations of various outcomes associated with delayed childbearing (Appendix Q). These outcomes were derived from the elicitation research reported in Study 1 (e.g., Delaying motherhood would help me to establish a career). Each item consisted of two parts. The first part of each item assessed the belief strength associated with each possible outcome. Specifically, participants were asked to rate the likelihood of each outcome on a 7-point scale ranging from *extremely unlikely* to *extremely likely*. Directly following this belief strength item was a statement assessing the participant's subjective evaluation of this outcome on a 7-point scale ranging from *extremely bad* to *extremely good*.

Prior to creating a composite scale the belief strength ratings were reverse coded for the items portraying negative outcomes in order to ensure that higher scores would reflect the belief that positive outcomes were more likely. Subsequent to this recoding the belief strength associated with each outcome was multiplied by the corresponding evaluation of the outcome for each item. The average of the 10 resultant products (each of which could range from 1-49) served as the composite belief-based measure of attitudes towards delayed childbearing ( $\alpha = .74$ ). This composite scale had a possible range of 1-49 where higher scores reflect more positive evaluations of the outcomes associated with delayed childbearing.

**2.2.3.2.7 Belief based subjective norms related to delayed childbearing.** Ten items were constructed to target the participants' perceptions of various social referents with regards to delayed childbearing (Appendix R). The specific social referents were derived from the

elicitation research reported in Study 1 and previous research in the area (e.g., Mother, Physician). Again, each item consisted of two parts. The first part of each item assessed the normative belief concerning the expectation of the specified referent group. Specifically, participants were asked to rate the likelihood that the specified referent thinks they should delay childbearing on a 7-point scale ranging from *extremely unlikely* to *extremely likely*. Directly following this normative belief item was a statement assessing how important the referent's wishes were to the participants on a 7-point scale ranging from *extremely unimportant* to *extremely important*. For each item participants were presented with the option of checking a box indicating that this specific social referent was not applicable to them.

A preliminary examination of the responses revealed that a large number of participants indicated that specific referent groups were not applicable. These specific referent groups were: spouse/partner; physician; religious community; cultural group; and feminist groups. Each of these referent groups were marked as not applicable by greater than 30% of the participants, and thus these items were deleted from further analyses. The remaining five items (mother, father, siblings/cousins, grandparents, and friends) were used to create a composite belief-based measure of social norms regarding delayed childbearing. For each item the normative belief was multiplied by the subjective importance rating and the average of the five resultant products formed the composite measure of belief-based social norms. This composite scale had a possible range of 1-49 where higher scores reflect higher perceived normative pressure to delay childbearing. The internal consistency index ( $\alpha = .77$ ) indicated satisfactory reliability.

**2.2.3.2.8 Belief based perceived behavioural control over delayed childbearing.** Nine items were constructed to measure participant's beliefs regarding specific factors which may either impede or facilitate attempts to delay childbearing (Appendix S). These factors were

derived from the elicitation research reported in Study 1 (e.g., Fertility treatments will be successful in helping me to get pregnant if I have difficulties in the future). Each item consisted of two parts. The first part of each item assessed the participants' beliefs regarding the likelihood of the circumstance outlined in the item. Specifically, participants were asked to rate the likelihood of each circumstance occurring on a 7-point scale ranging from *extremely unlikely* to *extremely likely*. Directly following was a statement assessing the extent to which the participant agreed that the circumstance would make it easier for them to delay motherhood on a 7-point scale ranging from *strongly disagree* to *strongly agree*.

The likelihood ratings were multiplied by the corresponding evaluation of facilitating effect for each item. The average of the nine resultant products served as the composite belief-based measure of perceived control over delayed childbearing ( $\alpha = .75$ ). This composite scale had a possible range of 1-49 where higher scores reflect a higher degree of perceived control over delaying childbearing.

**2.2.3.2.9 Intentions toward delayed childbearing.** Individual intentions were measured using four items (Appendix T). Each item was constructed to target the extent to which each individual participant personally intended to delay childbearing (e.g., I plan to delay motherhood). Participants were asked to indicate their level of agreement with each statement on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*).

The average of the summed individual items was calculated to create a composite score measuring intentions. The final composite score for intentions to delay childbearing had a possible range from 1-7 where higher scores reflect greater intentions. The internal consistency index ( $\alpha = .97$ ) indicated sufficient reliability.

**2.2.3.2.10 Personal and reproductive demographics.** In order to put the study variables into context, participants were asked a series of personal and reproductive demographic questions (Appendix U). Participants were asked to indicate whether or not they have children, their age, and their sex in order to restrict the data analyses to young childless women. Participants were also asked a series of questions related to their future reproductive intentions.

## **2.2.4 Results**

### **2.2.4.1 Fertility knowledge.**

**2.2.4.1.1 Group differences in fertility knowledge – manipulation check.** In order to ensure that the experimental manipulation of information provision was effective the response patterns on the fertility knowledge items were examined between the groups. The t-test conducted on the total correct fertility knowledge score indicated that the fertility information group ( $M = 3.8$ ,  $SD = 0.47$ ) answered approximately twice as many items correctly as the alcohol information group ( $M = 1.7$ ,  $SD = 1.00$ ),  $t(67) = 11.16$ ,  $p < 0.001$ . Subsequent analyses were conducted to explore if there were group differences in the response patterns for each individual item. The results of these chi-square analyses revealed that the fertility information group participants were more likely to respond correctly on each individual item than the alcohol information group. Please refer to Table 2-5 for a summary of these results.



Table 2-5. Number of correct responses on fertility knowledge items by group (% correct)

Knowledge items	Fertility information group (n = 35)	Alcohol information group (n = 34)	$\chi^2$	p
Biological optimum age for children	35 (100%)	30 (88.2%)	4.37	0.04
Age Fertility decline begins for women	31 (88.6%)	11 (32.4%)	22.88	< 0.001
Cost of IVF	35 (100%)	12 (35.3%)	33.25	< 0.001
Effectiveness of ART for women >45 years	32 (91.4%)	5 (14.7%)	40.82	< 0.001

**2.2.4.1.2 Fertility knowledge: Item analyses.** The responses for each fertility knowledge item were examined for the alcohol information group only. It was assumed that this group represented the base rate level of knowledge among young childless women because they were not provided with the fertility information intervention. Please refer to Table 2-6 for a summary of the responses.

Table 2-6. Fertility knowledge responses – Alcohol information group

Optimum Age		Fertility Decline		IVF Cost		ART Effectiveness	
Response	Frequency	Response	Frequency	Response	Frequency	Response	Frequency
16 to 19	3(8.8%)	16 years	0	500-1.5K	0	<b>9%</b>	5(14.7%)
<b>20 to 25</b>	30(88.2%)	<b>28 years</b>	11(32.4%)	5K-9K	18(52.9%)	17%	8(23.5%)
34 to 37	1(2.9%)	32 years	16(47.1%)	<b>11K-13K</b>	12(35.3%)	33%	17(50.0%)
40 to 45	0	40 years	7(20.6%)	70K-80K	4(11.8%)	52%	4(11.8%)

*Note.* Correct responses are indicated in bold.

#### **2.2.4.2 Scale properties and inter-correlations among theory of planned behavior variables.**

The means and standard deviations of the scales measuring the components of TPB are reported in Table 3. These results are presented for all of the participants as well as for the two intervention groups – those who received fertility information and those who received alcohol information.

The average score for all participants on the direct measure of attitudes ( $M = 4.11$ ,  $SD = 0.86$ ) indicated neutral attitudes towards delayed childbearing. This suggests they did not feel overly positive or negative about delayed childbearing. The average score for all participants on the direct measure of subjective norms ( $M = 3.74$ ,  $SD = 1.35$ ) indicated participants had neutral to low perceptions of subjective norms regarding delayed childbearing. This suggests they did not feel overly pressured from social referents with respect to delayed childbearing. The average score for all participants on the direct measure of intentions ( $M = 3.71$ ,  $SD = 1.89$ ) revealed neutral to low intentions regarding delayed childbearing, suggesting slightly low intentions to delay childbearing. However, the average score for participants did indicate moderately high levels of perceived control over delayed childbearing ( $M = 5.40$ ,  $SD = 1.32$ ) suggesting that participants, on average, felt more in control over their ability to delay childbearing.

Table 2-7. Means and standard deviations of the TPB constructs

	All Participants ( <i>N</i> = 69)	Fertility Information Group ( <i>N</i> = 35)	Alcohol Information Group ( <i>N</i> = 34)
Indirect (belief based)			
Attitudes	23.50(4.57)	22.07(4.58)	24.97(4.13)
Subjective norms	19.97(8.38)	18.44(8.00)	21.53(8.58)
Perceived control	23.90(6.64)	22.86(6.51)	24.96(6.70)
Direct			
Attitudes	4.11(0.86)	3.89(0.82)	4.32(0.86)
Subjective norms	3.74(1.35)	3.58(1.25)	3.90(1.45)
Perceived control	5.40(1.32)	5.13(1.28)	5.68(1.33)
Intentions	3.71(1.89)	3.16(1.71)	4.26(1.93)

*Note.* Standard deviations in parentheses. Belief based attitudes range from 1-49 with higher scores indicating more positive evaluations of outcomes associated with delayed childbearing. Belief based subjective norms range from 1-49 with higher scores indicating greater perceived normative pressure to delay childbearing. Belief based perceived control ranges from 1-49 with higher scores indicating a higher degree of perceived control over delayed childbearing. Direct attitudes range from 1-7 with higher scores indicating more positive attitudes towards delayed childbearing. Direct subjective norms range from 1-7 with higher scores indicating more perceived norms of delayed childbearing. Direct perceived control ranges from 1-7 with higher scores indicating more perceived control over delayed childbearing. Intentions range from 1-7 with higher scores indicating greater intentions to delay childbearing.

According to the TPB model, belief based measures of each theoretical construct should be related to the direct measures, which in turn should be related to behavioural intentions. Preliminary correlational analyses were conducted to confirm that all predicted relationships among the TPB variables were present. The results are presented in Table 2-8.

As seen in Table 2-8, the expected zero-order correlations were present among the components of TPB. Specifically, belief based attitudes were positively correlated with direct attitudes, belief based subjective norms were positively correlated with direct subjective norms,

and belief based perceived control was positively correlated with direct perceived control.

Further, direct attitudes, direct subjective norms, and direct perceived control were all positively correlated with intentions to delay childbearing.

Table 2-8. Correlations among the TPB variables

	BBA	BBSN	BBPC	DA	DSN	DPC	I
Belief based							
Attitudes (BBA)		.43**	.48**	.40**	.25*	.48**	.62**
Subjective Norms (BBSN)			.27*	.25*	.50**	.21	.34**
Perceived Control (BBPC)				.50**	.15	.45**	.44**
Direct measures							
Attitudes (DA)					.34**	.49**	.57**
Subjective Norms (DSN)						.19	.40**
Perceived Control (DPC)							.68**

Note. \* $p < .05$ , \*\* $p < .01$ .

### 2.2.4.3 Hypothesis 1 - testing the TPB model

The positive correlations between the TPB constructs provided initial support for the theory of planned behavior's effectiveness in explaining intentions to delay childbearing. The next step in confirming the applicability of this model was to perform a multiple regression analysis in which direct intentions to delay childbearing served as the dependent criterion variable. Direct attitudes, direct subjective norms, and direct perceived control served as the predictor variables.

A summary of this multiple regression analysis is presented in Table 2-9 including the unstandardized regression coefficients ( $B$ ) and standardized regression coefficients ( $\beta$ ). Specifically,  $B$  represents the change in the dependent variable associated with a one-unit change in a predictor variable, all other predictors being held constant, while  $\beta$  is the average amount the dependent variable increases when the predictor increases one standard deviation and other predictors are held constant. Also included in Table 2-9 are the semi-partial correlations ( $sr^2$ ), which refer to the percent of variance in the dependent variable uniquely attributable to the given predictor variable when other predictors in the equation are controlled for. Associated with multiple regression, as well, is the multiple correlation ( $R^2$ ) defined as the percent of the variance in the dependent variable explained by the predictors combined. The adjusted multiple correlation (*Adjusted  $R^2$* ) also refers to the percent of variance explained, but subtracts out the contribution of chance variations. Lastly, the correlation between the dependent variable and the best linear combination of the predictors is included ( $R$ ) as well as the zero order correlation between the predictor and the outcome variable ( $r$ ) (Tabachnick & Fidell, 2007).

In support of the theory of planned behaviour the regression analysis established that the three predictor variables combined explained 63% (61% adjusted) of the variance,  $F(3, 67) = 36.11, p < .001$ . Direct attitudes ( $sr^2 = .03$ ), direct subjective norms ( $sr^2 = .06$ ), and direct perceived control ( $sr^2 = .24$ ) made significant unique contributions to the prediction of intentions to delay childbearing.

Table 2-9. Summary of multiple regression analysis for variables predicting intentions to delay childbearing

	<i>r</i>	<i>B</i>	$\beta$	<i>sr</i> <sup>2</sup>	<i>R</i> <sup>2</sup>	<i>Adjusted R</i> <sup>2</sup>	<i>R</i>
Direct Measures					.63	.61	.79
Attitudes	.57**	.44*	.20	.03			
Social Norms	.40**	.38**	.27	.06			
Perceived Control	.68**	.80***	.56	.24			
Belief Based Measures					.42	.39	.65
Attitudes	.62**	.21***	.50	.17			
Subjective Norms	.34**	.02	.08	.005			
Perceived Control	.44**	.05	.18	.03			

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

For comparison purposes a second regression analysis was conducted to examine the predictive ability of the belief based measures of the TPB constructs (see Table 2-9). As expected these indirect measures of attitudes, subjective norms, and perceived control as a group accounted for less variance in intentions to delay childbearing. Specifically, the three predictor variables accounted for 42% (39% adjusted) of the variance. Although the overall model was significant,  $F(3, 68) = 15.70, p < .001$ , only belief based attitudes emerged as a significant unique predictor of intentions to delay childbearing ( $sr^2 = .17$ ).

Together, these two regression analyses provide support for Hypothesis 1 and substantiates that TPB provides an adequate framework for examining women's intentions to delay childbearing.

**2.2.4.3.1 Hypothesis 1a - more positive attitudes towards delayed childbearing will be associated with greater intentions to delay childbearing.** Analyses revealed positive zero-order correlations between direct attitudes and intentions ( $r = .57, p < .001$ ) and between belief

based attitudes and intentions ( $r = .62, p < .001$ ) indicating that more positive attitudes towards delayed childbearing were associated with greater intentions to personally delay childbearing. An examination of the regression analyses, summarized in Table 2-9, indicate that the direct measure of attitudes emerged as a significant predictor of intentions, uniquely accounting for 3% of the variance in that outcome variable. With respect to the indirect measures of the TPB constructs, only the belief based measure of attitudes emerged as a significant unique predictor of intentions accounting for 17% of the variance. This evidence provides support for Hypothesis 1a.

**2.2.4.3.2 Hypothesis 1b – higher social normative endorsement of delayed childbearing will be associated with greater intentions to delay childbearing.** Analyses revealed a positive zero-order correlation between direct subjective norms and intentions ( $r = .40, p = .001$ ) indicating that higher social normative endorsement was associated with greater intentions to personally delay childbearing. Further substantiating this relation, direct measures of subjective norms emerged as a significant predictor of intentions to delay childbearing within the regression analysis (see Table 2-9) accounting for 6% of the unique variance. However, a different picture was revealed when examining the indirect measures of subjective norms. Specifically, although there was a significant positive zero-order correlation between belief based measures of subjective norms and intentions ( $r = .34, p = .004$ ) this variable was not a significant predictor of intentions to delay childbearing in the regression model. This pattern of results supports Hypothesis 1b in that both the direct and indirect measures of subjective norms were positively correlated with intentions but, in line with the TPB model, only the most proximal measure (i.e., the direct measure) of subjective norms was uniquely predictive of intentions to delay childbearing.

**2.2.4.3.3 Hypothesis 1c – greater levels of perceived control over delayed childbearing will be associated with greater intentions to delay childbearing.** Analyses revealed a positive zero-order correlation between direct perceived control and intentions ( $r = .68, p < .001$ ) indicating that greater levels of perceived control were associated with greater intentions to personally delay childbearing. Further substantiating this relation, direct measures of perceived control emerged as a significant predictor of intentions to delay childbearing within the regression analysis (see Table 2-9), accounting for 24% of the unique variance. However, a different picture was revealed when examining the indirect measures of perceived control. Specifically, although there was a significant positive zero-order correlation between belief based measures of perceived control and intentions ( $r = .44, p < .001$ ), this variable was not a significant predictor of intentions to delay childbearing in the regression model. This pattern of results supports Hypothesis 1c in that both the direct and indirect measures of perceived control were positively correlated with intentions but, in line with the TPB model, only the most proximal measure of perceived control were uniquely predictive of intentions to delay childbearing.

**2.2.4.3.4 Hypothesis 1d – attitudes toward delayed childbearing will emerge as the most significant unique predictor of intentions to delay childbearing.** Contrary to the prediction, attitudes toward delayed childbearing were not the most significant unique predictor of intentions. Rather, as seen in Table 2-9, the direct measure of perceived control over delayed childbearing emerged as the most significant unique predictor of intentions accounting for 24% of the unique variance. However, when examining the belief based measures of the TPB variables belief based attitudes emerged as the only significant unique predictor of intentions accounting for 17% of the variance.



#### 2.2.4.4 Hypothesis 2 – testing the intervention

Before examining for the impact of the intervention, preliminary analyses were conducted to determine any group differences on variables that we would not expect to be impacted by the intervention. These analyses were done to ensure that there were no pre-existing group differences. Analyses revealed no group differences on the importance of becoming pregnant ( $M_{\text{fertility}} = 4.1, SD = 1.0; M_{\text{alcohol}} = 4.2, SD = 1.1; t(67) = -.58, p = .56$ ), desired number of children ( $M_{\text{fertility}} = 2.7, SD = .81; M_{\text{alcohol}} = 2.7, SD = .90; t(66) = -.43, p = .67$ ), or current age in years ( $M_{\text{fertility}} = 21.2, SD = 3.3; M_{\text{alcohol}} = 20.8, SD = 4.1; t(67) = .42, p = .68$ ).

**2.2.4.4.1 Hypothesis 2a – provision of information will result in lower intentions to delay childbearing for the fertility information group compared to the alcohol information group.** Group differences in intentions to delay childbearing were examined using an independent samples t-test. In support of the hypothesis the fertility information group ( $M = 3.2, SD = 1.7$ ) relayed significantly lower intentions to delay childbearing than the alcohol information group ( $M = 4.3, SD = 1.9, t(67) = -2.50, p = .015, \eta^2 = .086$ ). However, subsequent analyses revealed that although there was a highly significant positive correlation between reported intention to delay childbearing and reported intended age at first birth ( $r = .70, p < .001$ ) the two study groups did not differ on this latter variable ( $M_{\text{fertility}} = 27.2, SD = 2.9; M_{\text{alcohol}} = 28.4, SD = 3.6, t(66) = -1.51, p = .135$ ).

**2.2.4.4.2 Hypothesis 2b – provision of information will result in less perceived control over delayed childbearing for the fertility information group compared to the alcohol information group.** Contrary to expectations the two intervention groups did not differ on either the direct measure of perceived control ( $M_{\text{fertility}} = 5.1, SD = 1.3; M_{\text{alcohol}} = 5.7, SD =$

1.3;  $t(67) = -1.73, p = .09$ ) or the belief based measure of perceived control ( $M_{\text{fertility}} = 22.9, SD = 6.5; M_{\text{alcohol}} = 25.0, SD = 6.7; t(67) = -1.32, p = .19$ ).

**2.2.4.4.3 Hypothesis 2c – provision of information will have no impact on the perceived subjective norms associated with delayed childbearing for both the fertility information and alcohol information groups.** In support of the hypothesis there was no difference between the fertility information group ( $M = 3.6, SD = 1.3$ ) and the alcohol information group ( $M = 3.9, SD = 1.4$ ) on the direct measure of subjective norms associated with delayed childbearing,  $t(67) = -.98, p = .332$ . An examination of the belief based measure of subjective norms also showed no group difference providing further support for this hypothesis ( $M_{\text{fertility}} = 18.4, SD = 8.0; M_{\text{alcohol}} = 21.5, SD = 8.6; t(67) = -1.55, p = .13$ ).

**2.2.4.4.4 Hypothesis 2d – provision of information will result in less positive attitudes toward delayed childbearing for the fertility information group compared to the alcohol information group.** In support of the hypothesis the fertility information group reported less positive attitudes toward delayed childbearing than the alcohol information group. This pattern of results was evident with respect to both the direct measures of attitudes ( $M_{\text{fertility}} = 3.9, SD = 0.8; M_{\text{alcohol}} = 4.3, SD = 0.9; t(66) = -2.11, p = 0.039, \eta^2 = .063$ ) and the belief based measure of attitudes ( $M_{\text{fertility}} = 22.1, SD = 4.6; M_{\text{alcohol}} = 25.0, SD = 4.1; t(67) = -2.76, p = .008, \eta^2 = .102$ ).

## CHAPTER THREE DISCUSSION

There were two main purposes of the present study. The first was to apply the TPB to the prediction of intentions to delay childbearing among a sample of young childless women. The second was to examine the impact of information provision on young childless women's intentions to delay childbearing. Overall, the findings of this study support the applicability of a

theoretical model to the behavioural domain of delayed childbearing and the ability of information interventions to impact intentions to delay childbearing. In the sections below, the specific findings, both those that support the study hypotheses and those that emerged unexpectedly, will be outlined. Practical implications and directions for future research will also be discussed.

### **3.1 Adequacy of the TPB Framework**

The TPB postulates that attitudes, subjective norms, and perceived control combined determine behavioural intentions. In accordance with this premise, initial analyses revealed that attitudes toward the outcomes of delayed childbearing, the subjective norm of delayed childbearing, and perceived behavioural control over delayed childbearing were all positively correlated with intentions. The TPB also theorizes about the relationship of attitudes, subjective norms, and perceived control with their antecedents - behavioural beliefs, normative beliefs, and control beliefs, respectively. Analyses revealed positive correlations between attitudes and beliefs about the likely consequences of delayed childbearing (behavioural beliefs), subjective norms and beliefs about the normative expectations of others regarding delayed childbearing (normative beliefs), as well as perceived control and beliefs about the presence of factors that may facilitate or hinder one's ability to delay childbearing (control beliefs).

The positive correlations among the TPB constructs served as initial support for the theory of planned behavior's capability of explaining intentions to delay childbearing. To confirm the applicability of this model further a multiple regression analysis was performed using direct intentions to delay childbearing as the dependent criterion variable and direct measures of attitudes, subjective norms, and perceived control serving as the predictor variables. It was found that overall 63% of the variance in intentions to delay childbearing was accounted

for by the components of TPB. Independently, attitudes accounted for 3%, subjective norms accounted for 6%, and perceived control accounted for 24% of the unique variance in the prediction of intentions to delay childbearing. When examining the belief based measures of TPB belief based attitudes accounted for 17% of the variance and was the only significant unique predictor of intentions to delay childbearing. Neither normative beliefs nor control beliefs were found to be significantly predictive of intentions.

While these results support the overall hypothesis that TPB would provide an adequate framework for examining young childless women's intentions to delay childbearing, Hypothesis 1d (attitudes toward delayed childbearing will emerge as the most significant unique predictor of intentions to delay childbearing) was not supported. Past research suggests that attitudes tend to hold the strongest weight for determining intentions (Haggar et al., 2002; Fife-Shaw et al., 2007; French & Cooke, 2012). Yet attitudes toward delayed childbearing did not emerge as the most significant unique predictor of intentions to delay childbearing. Unexpectedly it was perceived control that emerged as the most significant unique predictor.

### **3.1.1 Theoretical Implications**

The results of these specific analyses provide support for the application of the TPB to the prediction of intentions to delay childbearing. As noted above, 63% of the variance in intentions to delay childbearing was accounted for by the components of TPB. A number of studies have shown that TPB provides a strong theoretical framework for predicting various health behaviours including fruit and vegetable intake, physical activity, alcohol consumption, smoking, and condom use (Conner & Norman, 2005). A meta-analysis of 237 tests of the TPB with respect to health behaviour reported that on average the TPB explained 44% of the variance

in intentions (McEachen, Conner, Taylor, & Lawton, 2011). This suggests that the amount of variance accounted for delayed childbearing intentions in the present study is quite high.

An interesting picture emerges from an examination of the unique variance accounted for by attitudes, subjective norms, and perceived control. Previous research would suggest that most often attitudes should hold the strongest weight in determining intentions followed by perceived control and subjective norms (Hagggar et al., 2002; Fife-Shaw et al., 2007; Glassman et al., 2010; French & Cooke, 2012). Yet in the present study, direct perceived control emerged as the strongest predictor of intentions to delay childbearing. These results suggest that behavioural interventions regarding delayed childbearing might be most effective if they target factors related to perceived control. For example, interventions could provide information related to fertility myths and risk factors that are more related to aspects of perceived control than attitudes or evaluations regarding the outcomes associated with delayed childbearing. Many women falsely believe in fertility myths (e.g., benefits of rural living), have low levels of knowledge regarding fertility risk factors (e.g., STIs), and believe that non-influential factors can increase fertility (e.g., health and fitness) (Bunting & Boivin, 2008; Daniluk et al., 2012). This evidence in addition to the results of the present study suggest that information interventions would be most effective if they are designed to target factors related to perceived control over delayed childbearing.

### **3.2 Effect of Intervention on Delayed Childbearing Intentions**

Commentators assume that the provision of information related to fertility and ART will be sufficient for changing women's behaviour with respect to delayed childbearing. The applicability of a theoretical model to substantiate this claim, however, has not yet been examined. Analyses in the present study assessing the impact of an intervention on intentions to

delay childbearing showed that there were significant group differences following the informational manipulation. Specifically, the fertility information group reported significantly lower intentions to delay childbearing than the alcohol information group.

While a significant difference in intentions to delay childbearing was found, most women from both intervention groups do not appear to have a desire to delay childbearing into a critical period. The alcohol intervention group represents the base level of intentions that would be expected within this target population and they reported all rather neutral direct and belief-based attitudes and subjective norms with respect to delayed childbearing. In essence, the women from this sample believe that delaying childbearing will result in neither positive nor negative outcomes for some factors in their lives and they are ambivalent about the importance of these outcomes. As well, these women do not expect high levels of approval nor disapproval from significant referent groups and their level of compliance with these groups is rather neutral. With respect to direct perceived control each group evidenced slightly higher than neutral levels of perceived control over delayed childbearing. This means they believe there are particular factors which will be present in the future that will facilitate their choice to delay childbearing.

Both groups reported similar intended ages at first birth with the average age being 27 for the fertility intervention group and 28 for the alcohol intervention group. These results are similar to other lines of research which have found the subjective ideal age interval for having children is between 25-34 years (Lampic et al., 2006; Rovei et al., 2010; Virtala et al., 2011; Dougall et al., 2012; Ekelin et al., 2012; Peterson et al., 2012). As well, these results reflect the provincial average age of first birth for Saskatchewan which was 27.2 years in 2009 (Statistics Canada, 2012). While the average age of intended first birth for this sample falls within the fertile window for women, female fertility begins to decline for women at approximately age 28

onwards with the decline becoming much faster after age 35 (Balasch & Gratacos, 2010; Bretherick et al., 2010; Virtala et al., 2011; Peterson et al., 2012). So even though these women report intentions to start having children before the average age of beginning fertility decline, many indicated wanting more than one child. As a result, they may face difficulties with fertility as they reach their early to mid-30s when trying to conceive subsequent children. Some of the factors which might also prevent these young women from realizing their fertility intentions include the decision to develop a career, not finding a suitable partner, or wanting to gain financial stability (Ryan et al., 2005; Benzies, 2008; Balasch & Gratacos, 2010; Iacovou & Tavares, 2011; Bayrampour et al., 2012).

When examining the impact of the fertility information intervention on the TPB constructs some unanticipated results were revealed. As previously explained, this intervention was designed based on the recommendations of commentators who believe women's behaviour with respect to childbearing can be altered with the provision of information targeting attitudes and perceived behavioural control. We expected that less positive attitudes and less perceived control would be reported by the fertility information group compared to the alcohol information group. These expectations were a result of the content included in the fertility information intervention which was specifically designed to target beliefs pertaining to attitudes and perceived behavioural control. It was found that the intervention significantly impacted attitudes toward delayed child bearing but had no impact on levels of perceived behavioural control.

### **3.2.1 Implications of Results Pertaining to Interventions**

The increasing trend of delayed childbearing concerns many researchers in the field in terms of the impact it has on fertility rates (Virtala et al., 2011; Daniluk et al., 2012; Johnson & Tough, 2012) and the risk of involuntary childlessness it potentially poses for individuals

(Karmon et al., 2011; Koert, 2012). As previously stated, commentators assume that greater public education about the risks of delayed childbearing (i.e., involuntary childlessness) as well as fertility-related factors (i.e., age-fertility decline, cost and effectiveness of ART) will change women's behaviour such that they will decide to have children earlier. In addition to providing a theoretical model for explaining how delayed childbearing intentions, and potentially behaviour, can be predicted the results of the present study have also provided evidence that informational interventions can effectively alter delayed childbearing intentions.

Despite the ability of the intervention to effectively change women's intentions with respect to delayed childbearing it did not effectively target all of the constructs of the TPB. I had specifically set out to target attitudes and perceived behavioural control by providing women with information related to the age-related fertility decline, infertility rates, cost of ART, and effectiveness rates of ART. This information was chosen specifically because knowledge rates about these topics are low among the general population (Daniluk, Koert, & Cheung, 2012; Johnson & Tough, 2012), the provision of this information is assumed to impact delayed childbearing intentions and behaviour (Rovei et al., 2010; Hashiloni-Dolev et al., 2011; Wright, 2011; Virtala et al., 2011; Ekelin et al., 2012; Johnson & Tough, 2012; Peterson et al., 2012; Daniluk et al., 2012), and this information targets both behavioural and control beliefs (the antecedents of attitudes and perceived control, respectively). The results showed that the information intervention effectively impacted behavioural beliefs and attitudes with respect to delayed childbearing, but had no impact on indirect and direct subjective norms or perceived control. The results with respect to normative beliefs and subjective norms were unsurprising as these constructs were not targeted with the information provided in the intervention.



Commentators have not made any suggestions with respect to altering social normative expectations of delayed childbearing so they were not the focus of the intervention.

The lack of impact the fertility information intervention had on direct and belief-based perceived behavioural control regarding delayed childbearing means these constructs were not effectively targeted with the information provided during the intervention. An item analysis of the relationships between the individual items from the belief-based perceived control measure (Appendix U) and intentions to delay childbearing revealed some significant correlations. Specifically, intention to delay childbearing was significantly correlated with the following items: “I will be fertile past the age of 30” ( $r = .45, p < .001$ ); “I will be using birth control in the future” ( $r = .26, p = .03$ ); and “I will desire to have children in the future” ( $r = .50, p < .001$ ). Overall, the item analysis suggests that future interventions targeting delayed childbearing and TPB questionnaires measuring control beliefs related to delayed childbearing need to focus more on specific control beliefs (e.g., relation between physical health and fertility)

In sum, the results pertaining to the predictive ability of the TPB with respect to delayed childbearing indicated that interventions designed to alter delayed childbearing intentions would be most effective if they target both perceived control and attitudes. While the current study’s fertility information intervention was successful at targeting both indirect and direct attitudes, the intervention had no effect on participants’ level of indirect or direct perceived behavioural control over delayed childbearing. Future research is required to determine which information would be most appropriate for effectively targeting perceived control over delayed childbearing.

### **3.3 Limitations and Directions for Future Research**

Results of the present study demonstrate support for the applicability of the TPB in predicting young childless women’s intentions to delay childbearing. As well, the impact of an

informational intervention on intentions to delay childbearing was substantiated using the framework of TPB. However, a number of limitations of the present study have been recognized. Consideration of these limitations will better inform directions for future research.

### **3.3.1 Sample Homogeneity**

The sample in the current study consisted of childless, university educated women with an average age of 21 years. As previously noted, this sample was appropriate for the present study because these women are at the beginning of their reproductive lives and are making decisions which may impact their decisions about the timing of childbearing (i.e., pursuing a university education). Another reason for why this sample was appropriate is because empirical evidence shows that more highly educated individuals intend to have more children, tend to revise their fertility intentions downwards more easily, and are more likely to delay having children (Toulemon & Testa, 2005; Lampic et al., 2006; Virtala et al., 2011). Therefore, investigating the delayed childbearing intentions of women from this age group is essential as they are most in need of an informational intervention. The results of the current study provide support for the ability of the TPB to predict delayed childbearing intentions of young, childless women as well as the effectiveness of informational interventions on women from this age group with respect to altering their delayed childbearing intentions. Future research is required though to determine the predictive ability of the TBP in explaining intentions to delay childbearing across different age groups and education levels. For example, understanding the predictive ability of the TPB for delayed childbearing among women who are 30 years or older would be pertinent as these women face an even greater risk of experiencing decreased fertility, pregnancy loss, obstetric complications, and unintended childlessness (Jacobsson et al., 2004; Cleary-

Goldman et al., 2005; Lampic et al, 2006; Tough et al., 2007; Balasch & Gratacos, 2010; Bretherick et al., 2010; Virtala et al., 2011; Peterson et al., 2012; Bayrampour et al., 2012).

### **3.3.2 Male Intentions to Delay Childbearing**

The results of this study revealed that for young childless women the TPB is an appropriate theoretical framework for the prediction of delayed childbearing. For most women though the ability to realize their fertility intentions is dependent on a male partner. A man's intentions with respect to delayed childbearing could significantly impact his female partner's intentions as they discuss and compromise on their plans to become parents together. Further, the weighting of the TPB constructs could be quite different for men. If that were the case, information interventions designed to impact men's delayed childbearing intentions would have to target the TPB constructs differently. It might be the case that for men attitudes account for more of the variance in delayed childbearing intentions than perceived control. Replicating the study with a sample of young childless men would further our understanding of the issue of delayed childbearing.

### **3.3.3 Measuring Intentions, Not Behaviour**

This study examined women's intentions with respect to delayed childbearing. For a true test of the TPB though we need to examine behaviour directly (Madden, Ellen, & Ajzen, 1992). Overall, intentions can be poor predictors of behaviour (Ajzen, 1991; Toulemon & Testa, 2005). According to TPB, to predict the performance of a target behaviour accurately three conditions must be met. The first is that measures of intention and perceived behavioural control must correspond with the behaviour being predicted (Ajzen, 1991). Specifically, intentions and perceptions of control must be assessed in relation to the target behaviour and the behaviour must occur in the same context as the one being specified (Ajzen, 1991). The second condition

required for accurately predicting behaviour is that the interval between the assessment of intentions and perceived behavioural control must be stable (Ajzen, 1991). Intentions or perceived behavioural control can be altered due to intervening events thus rendering the effect that the original measures of these variable no longer allow for accurate prediction of the target behaviour (Ajzen, 1991). The third requirement for accurate prediction of behaviour is that the level of perceived behavioural control should reflect actual control as closely as possible (Ajzen, 1991).

With the current study we simply took a snapshot of young childless women's intentions as they stood at the time, but intentions are not always predictive of future behaviour (Ajzen, 1991). As well, the timeframe between behavioural intentions and actual behaviour can diminish the predictive ability of the TBA (Madden, Ellen, & Ajzen, 1992). Many of the women sampled may decide in the future to have children earlier than they originally intended, some may decide to not have children at all, and others may postpone childbearing until they have met an adequate partner. Future research is required in order to determine how accurately measured intentions of women's childbearing intentions correspond with their subsequent childbearing behaviour. As previously stated, measuring actual behaviour is required to truly test the TPB (Madden et al., 1992). Ideally, a longitudinal study would follow up with a sample of young childless women after they have received an informational intervention targeting delayed childbearing intentions to determine if the intervention had a lasting impact on their intentions and if they were able to actually realize their intentions. A study of this nature would help guide TPB informational interventions and provide further support for the applicability of the TPB framework to delayed childbearing intentions.

The findings that TPB provides an adequate framework for predicting delayed childbearing intentions and that our information intervention was effective at targeting attitudes and intentions with respect to delayed childbearing were found solely for a sample of young childless women. Intentions to delay childbearing could vary across different age groups. As well, the constructs of TPB might be weighted differently across different age groups of women. For example, subjective norms might be weighted more than perceived control for 16 year old women because they are still highly dependent on and influenced by their parents and may not perceive delayed childbearing to be within their control. A cross sectional study of different age groups using the TPB as a theoretical framework for predicting delayed childbearing intentions could also help with the development of informational interventions targeting this behaviour.

#### **3.3.4 Future Success and Misguided Beliefs Regarding ART**

Today, medical interventions cannot fully overcome age-related declines in fertility for women (Maheshwari, Porter, Shetty, & Bhattacharya, 2008; Balasch & Gratacos, 2010; Virtala et al., 2011; Wright, 2011; Johnson & Tough, 2012; Koert, 2012). However, the success rates of assisted reproduction have been steadily increasing over the years and are likely to continue to increase as the technology improves and the demand also increases (Nicholson, 2005; Best Start, 2007; Canadian Fertility and Andrology Society, 2010). Public demand and inclusion criteria largely influence the average age at which women seek ART and a steady increase in the number of procedures performed in Canada was documented between 1999 and 2008 (Gunby et al., 2011). As ART success rates continue to increase (especially for women age 40 and older) the number of women seeking treatment and the trend of delayed childbearing may also continue to rise. While the women who received the information intervention in the current study planned on

average to have their first child at age 27, future researchers might observe an increase in the reported average age as a result of the rising ART success rates.

Some researchers have reported that delayed childbearing is rarely a conscious choice and an array of factors outside of a woman's control can influence timing of childbearing (Cooke et al., 2012). Researchers also believe that health professionals and the media (i.e., Internet, television, and newspapers) should be aware of the complexity of delayed childbearing decisions and that the provision of more accurate and accessible information is required (Cooke et al., 2012). Much blame has been imparted on newspaper headlines and television specials for presenting images and stories of women who have given birth after age 45 and even 50 years (Wyndham et al., 2012). Largely, this has resulted in women and men believing that ART can compensate for the age-related declines in fertility (Johnson & Tough, 2012). Further research is required to explore the impact that the media has had on the general public's understanding of fertility and ART. As well, developers of future information interventions might want to consider educating young women on the potential personal and social disadvantages associated with advanced maternal age including smaller families than originally desired, lack of energy for parenting, less available lifetime to spend with children, and potential stigma as older parents (Dougall et al., 2012). These issues should be taken into consideration for the development of information interventions and when empirically examining the factors which contribute to delayed childbearing and the use of ART.

### **3.4 Conclusion**

Both empirical and theoretical contributions have been made to the literature on delayed childbearing with the findings from the current study. Support for the application of the theory of planned behavior as a theoretical framework to predict young childless women's intentions to

delay childbearing was found. Specifically, the TPB components accounted for 63% of the overall variance in intentions to delay childbearing. Independently, attitudes accounted for 3%, subjective norms accounted for 6%, and perceived control accounted for 24% of the unique variance in the prediction of intentions to delay childbearing. Neither normative beliefs nor control beliefs significantly predictive of intentions, but belief based attitudes accounted for 17% of the variance in intentions to delay childbearing. Because direct perceived control emerged as the strongest predictor of intentions to delay childbearing, this suggests that behavioural interventions regarding delayed childbearing would be most effective if they target factors related to perceived control.

In addition to the theoretical findings the results of the present study also provided evidence that informational interventions can effectively alter delayed childbearing intentions. Despite the finding that the fertility information group had significantly lower intentions to delay childbearing compared to the alcohol information group neither group as a whole evidenced intentions to delay childbearing into a declining period of fertility. An examination of the impact of the fertility information intervention on the TPB constructs revealed some unanticipated findings. It was expected that less positive attitudes and less perceived control would be reported by the fertility information group compared to the alcohol information group as these constructs were specifically targeted with the experimental intervention. While the fertility information intervention was successful at targeting both belief based and direct attitudes, it had no impact on belief based or direct perceived control over delayed childbearing. These findings suggest that future research is required to determine which information would be most appropriate for effectively targeting perceived control over delayed childbearing, especially results of the TPB

model examination revealed that perceived control was the most significant unique predictor of intentions to delay childbearing.

Although the women from the present study did not evidence intentions to delay childbearing into a critical period of fertility, they are intending to commence childbearing at an age when female fertility begins to decline. As a result, they may be at risk for a number of negative outcomes with respect to fertility and face difficulties with conception. Therefore, additional research is required to determine the best way to educate women on issues related to fertility. The results of this study have also shown that the theory of planned behavior is an effective model for examining intentions to delay childbearing. Further research is required in order to determine the ability of this model to examine delayed childbearing among other social groups.



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## APPENDIX A: ELICITATION PHASE PARTICIPANT POOL ADVERTISEMENT

**Study Title:** Elicitation of reproductive beliefs and intentions.

**Researchers:** Linzi Williamson, Applied Social Psychology masters student, supervised by Dr. Karen Lawson, Department of Psychology, University of Saskatchewan.

This is a research study designed to examine reproductive intentions, personal beliefs of delaying childbearing, normative beliefs of delaying childbearing, and perceived behavioural control of delaying childbearing. If you would like to participate, you will be asked to complete a 30-minute survey examining these variables.

In exchange for participating you will receive 1 credit towards your Psychology 110 grade. Completing this survey provides you with a chance to share your experiences and contribute to research that may be used to help change the way the sex education is taught in schools. Your feelings and experiences are important and may help us to understand what current sex education programs are lacking and how that might impact an individual's choices regarding reproduction and childbearing.



## APPENDIX B: ETHICS APPROVAL CERTIFICATE FOR ELICITATION STUDY



UNIVERSITY OF  
SASKATCHEWAN

Behavioural Research Ethics Board (Beh-REB)

### *Certificate of Approval*

PRINCIPAL INVESTIGATOR  
Karen Lawson

DEPARTMENT  
Psychology

BEH#  
12-337

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED  
University of Saskatchewan

STUDENT RESEARCHER(S)  
Linzi Williamson

FUNDER(S)  
INTERNALLY FUNDED

TITLE  
Elicitation of Reproductive Beliefs and Intentions

ORIGINAL REVIEW DATE  
03-Dec-2012

APPROVAL ON  
07-Jan-2013

APPROVAL OF:  
Application for Behavioural Research Ethics  
Review  
Participant Pool Advertisement  
Implied Consent Form  
Elicitation Study Questionnaire  
Debriefing Form

EXPIRY DATE  
06-Jan-2014

Full Board Meeting ☐

Delegated Review ☒

#### **CERTIFICATION**

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

#### **ONGOING REVIEW REQUIREMENTS**

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: [http://www.usask.ca/research/ethics\\_review/](http://www.usask.ca/research/ethics_review/)

Please send all correspondence to:

Research Ethics Office  
University of Saskatchewan  
Box 5000 RPO University, 1602-110 Gymnasium Place  
Saskatoon SK S7N 4J8  
Telephone: (306) 966-2975 Fax: (306) 966-2069

## APPENDIX C: ELICITATION PHASE CONSENT FORM



### Elicitation of reproductive beliefs and intentions

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You are invited to participate in a research study entitled *Elicitation of reproductive beliefs and intentions*. Please read this form carefully, and feel free to ask any questions you might have about the study.

**Student-Researcher:** Linzi Williamson, Department of Psychology,

**Supervisor:** Karen Lawson, Department of Psychology,

**Purpose and Procedure:** The proposed study is designed to examine the following research question: What are the salient behavioural beliefs (beliefs about the consequences of performing the behaviour), the salient normative beliefs (beliefs about the views of significant others), and the salient control beliefs (beliefs about factors that may facilitate or impede performance of the behaviour) among individuals regarding delayed childbearing?

Knowledge levels of fertility, reproduction, and assisted reproductive technology (ART) are low among the general population. There have been increasing trends for women, particularly in Western countries, to delay childbearing and for many individuals to turn to various forms of ART to aid reproduction. Delayed childbearing is traditionally defined as pregnancy occurring in women aged >35 years. The purpose of this proposed study is to examine individual beliefs regarding delayed childbearing. This information will then lead to the development of future studies examining this issue further.

If you decide to participate, you will be asked to complete a survey that examines your reproductive intentions and beliefs regarding delayed childbearing. Some of the questions do deal with topics that are sensitive to some individuals. Please feel free to leave unanswered any questions that make you feel uncomfortable. The study should take approximately 30 minutes of your time.

**Risks:** There are no known risks associated with participation in this study. Furthermore, you may receive no personal benefits from participation in the study. At the end of the study you will be given a sheet that better explains the nature of the study and you will be given a chance to ask any further questions that you might have.

**Confidentiality:** Your data will be kept completely confidential and no personally identifying information will be linked to your data. All data will be reported in aggregated form. The data

and consent forms will be stored securely at the University of Saskatchewan by the supervisor for five years after the study completion. More specifically, the data will be stored separately from the consent forms. The data will be used as the basis for the student-researcher's (Linzi Williamson) M.A. thesis. The data may be published in an academic journal and/or presented at a professional conference. When the data is no longer required, it will be destroyed beyond recovery.

**Right to withdraw:** You may withdraw from the study for any reason, at any time, without penalty of any sort and/or without loss of a research credit. If you withdraw from the study, any data that you have contributed will be destroyed beyond recovery. However, due to the de-identified nature of the database, you will not be able to withdraw your data once it has been entered into the electronic database because of the inability to identify the data of any specific individual.

**Questions:** If you have any questions concerning the study, please feel free to ask at any point. You are also free to contact the researchers at the numbers provided above if you have questions at a later time. This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office [ethics.office@usask.ca](mailto:ethics.office@usask.ca) (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

**Consent to Participate:** I have read and understand the description of the research study provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I agree to participate in the study described above, understanding that I may withdraw my consent to participate at any time. A copy of this consent form has been given to me for my records. As participation in this study will be anonymous, my consent to participate will be implied so my signature will not be provided.

## APPENDIX D: ELICITATION PHASE QUESTIONNAIRE

The following questionnaire is intended primarily for women to complete. If you are male and there are questions you are unsure about, please try your best to respond or leave the question blank. You will have 30 minutes to complete this survey. These questions will ask you about your attitudes, beliefs, and knowledge related to childbearing and assisted human reproduction. Please read each question carefully and answer each question to the best of your ability. Please answer honestly.

1. Do you currently have children? (please check one)
  - ☐ Yes
  - ☐ No
2. Do you plan on becoming pregnant in the future? (please check one)
  - ☐ 1 – Not at all likely
  - ☐ 2 – Unlikely
  - ☐ 3 – Neither unlikely or likely
  - ☐ 4 – Likely
  - ☐ 5 – Extremely likely
3. How old do you expect to be when you give birth to your first child? (list age in years)
4. How old do you expect to be when you give birth to your last child? (list age in years)
5. How many children do you hope to give birth to in your life? (list number)
6. Do you plan on pursuing a profession/career in the future?
  - ☐ 1 – Not at all likely
  - ☐ 2 – Unlikely
  - ☐ 3 – Neither unlikely or likely
  - ☐ 4 – Likely
  - ☐ 5 – Extremely likely
7. Sex? (please check one)
  - ☐ Male
  - ☐ Female
8. Age? (list age in years)

### **Theory of Planned Behaviour Elicitation**

1. What do you think would be the main advantages for you of waiting until after the age of 35 to become pregnant? (please write in the space below)
2. What do you think would be the main disadvantages for you of waiting until after the age of 35 to become pregnant? (please write in the space below)
3. Are there any groups or people who would approve of you waiting until after the age of 35 to become pregnant? (please write in the space below)

4. Are there any groups or people who would disapprove of you waiting until after the age of 35 to become pregnant? (please write in the space below)
5. What do you think would make it difficult to wait until after the age of 35 to become pregnant? (please write in the space below)
6. What do you think would make it easy to wait until after the age of 35 to become pregnant? (please write in the space below)

## APPENDIX E: ELICITATION PHASE DEBRIEFING FORM



### Elicitation of reproductive beliefs and intentions

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Thank you for your participation in this study! Your participation is sincerely appreciated, and we hope that you have found your experience to be interesting. As noted in the consent form provided to you, this study is examining individual reproductive intentions and beliefs regarding delayed childbearing. Our main research question is: What are the salient behavioural beliefs (beliefs about the consequences of performing the behaviour), the salient normative beliefs (beliefs about the views of significant others), and the salient control beliefs (beliefs about factors that may facilitate or impede performance of the behaviour) among individuals regarding delayed childbearing?

Knowledge about fertility health issues is important for people to have in order to prevent fear, unnecessary delay in seeking fertility treatment, and infertility or involuntary childlessness. To address the significant lack of awareness regarding fertility and infertility treatments, and trends in delayed childbearing among the general public, many researchers have argued for the need to improve education on these topics. However, the impact of education efforts targeting women's intentions to delay childbearing has not yet been examined. Furthermore, the existing literature is based on descriptive, atheoretical research that is limited in terms of informing intervention protocols. In the future, we would like to expand on the existing literature by examining the impact of education initiatives on young women's reproductive intentions using the theoretical framework of the theory of planned behaviour.

Because this study is exploratory in nature, no specific hypotheses are being posited. Rather, the goal of the proposed investigation is to examine individual beliefs regarding delayed childbearing. This information will then lead to the development of future studies examining this issue further.

The results of this study will be posted on our reproductive psychology research team website ([www.reproductivepsy.usask.ca](http://www.reproductivepsy.usask.ca)) at the end of the study (August 2013). You may also choose to contact the researchers by email for a summary of the results.

Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office [ethics.office@usask.ca](mailto:ethics.office@usask.ca) (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

**Researchers:** Linzi Williamson, Applied Social Psychology masters student, supervised by Dr. Karen Lawson, Department of Psychology, University of Saskatchewan.

## APPENDIX F: STUDY 2 PARTICIPANT POOL ADVERTISEMENT

**Study Title:** Young Women's Intentions regarding Motherhood

**Researchers:** Linzi Williamson, Applied Social Psychology masters student, supervised by Dr. Karen Lawson, Department of Psychology, University of Saskatchewan.

This is a research study designed to examine reproductive intentions. If you would like to participate, you will be asked to watch a 10-minute Powerpoint presentation, after which you will complete a 20-minute survey measuring your reproductive intentions and the components of the theory of planned behavior. The study should take approximately 30 minutes of your time.

In exchange for participating you will receive 1 credit towards your Psychology 110 grade. Completing this survey provides you with a chance to share your experiences and contribute to research that may be used to help change the way the sex education is taught in schools. Your feelings and experiences are important and may help us to understand what current sex education programs are lacking and how that might impact an individual's choices regarding reproduction and childbearing.



## **Call for Volunteers**

**The Reproductive Psychology Laboratory invites you to take part in our research on**

### ***Young Women's Intentions Regarding Delayed Childbearing***

Volunteers will be asked to partake in a study examining reproductive intentions. All data collected will be used as the basis for the student researcher's M.A. thesis.

Participants will meet with Linzi Williamson for one study session to watch a brief presentation then complete a survey examining beliefs, attitudes and intentions regarding motherhood. The session will take approximately **30 minutes** and will take place in a psychology lab on campus.

**You may also enter your name into a draw for \$100**

Participants are guaranteed confidentiality and may withdraw their participation at any time for any reason.

**If interested, please email the student researcher**

## APPENDIX H: STUDY 2 PERSONALIZED ACCESS TO WEB SERVICES (PAWS)

### ADVERTISEMENT

**Study Title:** Young Women's Intentions Regarding Motherhood

**Researchers:** Linzi Williamson, Applied Social Psychology masters student, supervised by Dr. Karen Lawson, Department of Psychology, University of Saskatchewan.

This is a research study designed to examine reproductive intentions. If you would like to participate, you will be asked to watch a 10-minute Powerpoint presentation focusing on health related information, after which you will complete a 20-minute survey measuring your beliefs, attitudes, and intentions regarding motherhood. The study should take approximately 30 minutes of your time.

Participants will be entered into a draw for \$100.

Interested individuals are asked to contact that student research to arrange for a convenient date and time to complete the study on the University of Saskatchewan campus.

## APPENDIX I: ETHICS APPROVAL CERTIFICATE FOR STUDY 2



UNIVERSITY OF  
SASKATCHEWAN

Behavioural Research Ethics Board (Beh-REB)

### ***Certificate of Approval***

PRINCIPAL INVESTIGATOR  
Karen Lawson

DEPARTMENT  
Psychology

BEH#  
13-44

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED  
University of Saskatchewan

STUDENT RESEARCHER(S)  
Linzi Williamson

FUNDER(S)  
INTERNALLY FUNDED

TITLE  
Young Women's Intentions Regarding Motherhood

ORIGINAL REVIEW DATE  
27-Feb-2013

APPROVAL ON  
01-Mar-2013

APPROVAL OF:  
Application for Behavioural Research Ethics  
Review  
Consent Form  
Survey  
Participant Pool Advertisement  
Debriefing Form

EXPIRY DATE  
28-Feb-2014

Full Board Meeting ☐

Delegated Review ☒

#### **CERTIFICATION**

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

#### **ONGOING REVIEW REQUIREMENTS**

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: [http://www.usask.ca/research/ethics\\_review/](http://www.usask.ca/research/ethics_review/)

Please send all correspondence to:

Research Ethics Office  
University of Saskatchewan  
Box 5000 RPO University, 1602-110 Gymnasium Place  
Saskatoon SK S7N 4J8  
Telephone: (306) 966-2975 Fax: (306) 966-2069

## APPENDIX J: ETHICS APPROVAL CERTIFICATE FOR STUDY 2 MEMORANDUM



UNIVERSITY OF  
SASKATCHEWAN

Behavioural Research Ethics Board (Beh-REB)

### ***Certificate of Approval Study Amendment***

PRINCIPAL INVESTIGATOR  
Karen Lawson

DEPARTMENT  
Psychology

Beh #  
13-44

INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT  
University of Saskatchewan

STUDENT RESEARCHER(S)  
Linzi Williamson

FUNDER(S)  
INTERNALLY FUNDED

TITLE  
Young Women's Intentions Regarding Motherhood

APPROVAL OF  
Changes to the recruitment protocol  
Advertisement  
Recruitment Poster

APPROVED ON  
01-Apr-2013

CURRENT EXPIRY DATE  
28-Feb-2014

Full Board Meeting ☐

Delegated Review ☒

#### **CERTIFICATION**

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

#### **ONGOING REVIEW REQUIREMENTS**

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: [http://www.usask.ca/research/ethics\\_review/](http://www.usask.ca/research/ethics_review/)

Please send all correspondence to:

Research Ethics Office  
University of Saskatchewan  
Box 5000 RPO University, 1602-110 Gymnasium Place  
Saskatoon SK S7N 4J8  
Telephone: (306) 966-2975 Fax: (306) 966-2069

## APPENDIX K: STUDY 2 CONSENT FORM



### Young Women's Intentions regarding Motherhood

---

You are invited to participate in a research study entitled *Young Women's Intentions regarding Motherhood*. Please read this form carefully, and feel free to ask any questions you might have about the study.

**Student-Researcher:** Linzi Williamson, Department of Psychology

**Supervisor:** Karen Lawson, Department of Psychology

**Purpose and Procedure:** The proposed study is designed to examine the following research questions: 1) Can the theory of planned behavior be applied for predicting women's intentions to delay childbearing? And 2) Does the provision of detailed, accurate, and accessible information alter individual attitudes and levels of perceived control surrounding delayed childbearing?

Knowledge levels of fertility, reproduction, and assisted reproductive technology (ART) are low among the general population. There have been increasing trends for women, particularly in Western countries, to delay childbearing and for many individuals to turn to various forms of ART to aid reproduction. Delayed childbearing is traditionally defined as pregnancy occurring in women aged >35 years. The purpose of this proposed study is to examine individual beliefs regarding delayed childbearing. This information will then lead to the development of future studies examining this issue further.

If you decide to participate, you will be asked to watch a 10-minute Powerpoint presentation, after which you will complete a 20-minute survey measuring your reproductive intentions and the components of the theory of planned behavior. Some of the questions do deal with topics that are sensitive to some individuals. Please feel free to leave unanswered any questions that make you feel uncomfortable. The study should take approximately 30 minutes of your time.

**Risks:** There are no known risks associated with participation in this study. Furthermore, you may receive no personal benefits from participation in the study. At the end of the study you will be given a sheet that better explains the nature of the study and you will be given a chance to ask any further questions that you might have.

**Confidentiality:** Your data will be kept completely confidential and no personally identifying information will be linked to your data. All data will be reported in aggregated form. The data

and consent forms will be stored securely at the University of Saskatchewan by the supervisor for five years after the study completion. More specifically, the data will be stored separately from the consent forms. The data will be used as the basis for the student-researcher's (Linzi Williamson) M.A. thesis. The data may be published in an academic journal and/or presented at a professional conference. When the data is no longer required, it will be destroyed beyond recovery.

**Right to withdraw:** You may withdraw from the study for any reason, at any time, without penalty of any sort and/or without loss of a research credit. If you withdraw from the study, any data that you have contributed will be destroyed beyond recovery. However, due to the de-identified nature of the database, you will not be able to withdraw your data once it has been entered into the electronic database because of the inability to identify the data of any specific individual.

**Questions:** If you have any questions concerning the study, please feel free to ask at any point. You are also free to contact the researchers at the numbers provided above if you have questions at a later time. This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office [ethics.office@usask.ca](mailto:ethics.office@usask.ca) (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

**Consent to Participate:** I have read and understand the description of the research study provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I agree to participate in the study described above, understanding that I may withdraw my consent to participate at any time. A copy of this consent form has been given to me for my records.

---

(Signature of Participant)

---

(Date)

---

(Signature of Researcher)

## APPENDIX L: FERTILITY-RELATED FACTS PRESENTATION SLIDES

### FERTILITY-RELATED FACTS

#### OUTLINE OF PRESENTATION

- Fertility & Fertility Trends
- Age & Fertility
- Infertility
- Assisted Reproductive Techniques

#### FERTILITY & FERTILITY TRENDS

- Defined as the ability to produce offspring
- Fertility rates in developed countries have **declined**
- **More** women are delaying childbearing

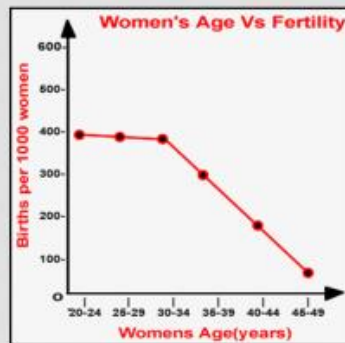
19.  
Solen, 2005; Statistics Canada, 2007; Berdes, 2008; Lonsic, Svanberg, Karlstrom, &  
Tyden, 2006; Wright, 2011; Virsik, Viskla, Huhtanen, & Kurits, 2011; Darluk, Koert, &  
Cheung, 2012; Hyde, Delamater, & Byers, 2012; Johnson & Tough, 2012

## AGE AND FERTILITY

- Maternal **age most important** determinant of fertility
- **Optimum time** for children is **age 20 to 25**
- Significant decline in fertility **actually begins age 28 onwards**, **faster decline after age 37**

Virhala, Vilho, Huttunen, & Kurthu, 2011; Johnson & Tough, 2012; Peterson, Pirritano, Tucker, & Lampic, 2012

## FEMALE FERTILITY DECLINE



## INFERTILITY

- Woman's **inability to conceive** and give birth to a living child, or man's **inability to impregnate** a woman
- **8.5-16%** of couples in Canada are **infertile**

Barrett, 2006; Smith, Eisenberg, Glidden, Milstein, Cedars, Walsh, Showstack, Pasch, Adler, & Katz, 2011; Cassidy & Sinkovskii, 2008; Hyde, Delamater, & Byers, 2012



## COST OF ASSISTED REPRODUCTIVE TECHNIQUES

- Most people cannot afford assisted reproduction
- IVF **most intensive and costly**
- Each IVF cycle = **\$11,000 to \$13,000 CAD**

Lampic, Svanberg, Karlstrom, & Tyden, 2006; Daniluk, Koert, & Cheung, 2012; Statistics Canada, 2001; Levesque, 2004; Naker, 2008; LaRosa, 2009; Virtala, Viskio, Huttunen, & Kurhju, 2011; Wright, 2011; Johnson & Tough, 2012; Wyndham, Figueira, & Patisso, 2012.

## EFFECTIVENESS OF ASSISTED REPRODUCTIVE TECHNIQUES

- **Less than 50%** age-related fertility decline for women **30-35 years** can be overcome with ART
- **Less than 33%** age-related fertility decline for women **35-40 years**
- **About 9%** ART cycles result in pregnancies for women over **age 42** compared to **48%** for women **age 35+**

Lampic, Svanberg, Karlstrom, & Tyden, 2006; Daniluk, Koert, & Cheung, 2012; Statistics Canada, 2001; Levesque, 2004; Naker, 2008; LaRosa, 2009; Virtala, Viskio, Huttunen, & Kurhju, 2011; Wright, 2011; Johnson & Tough, 2012; Wyndham, Figueira, & Patisso, 2012.

## APPENDIX M: ALCOHOL-RELATED FACTS PRESENTATION SLIDES

The image displays three presentation slides stacked vertically. The first slide is titled 'ALCOHOL-RELATED FACTS' and features a green horizontal bar and a green square. The second slide is titled 'OUTLINE OF PRESENTATION' and lists six topics. The third slide is titled 'ALCOHOL & POTENTIAL EFFECTS' and lists five effects of alcohol, with some terms highlighted in red. All slides have a small speaker icon in the bottom right corner.

### ALCOHOL-RELATED FACTS

### OUTLINE OF PRESENTATION

- Alcohol and potential effects
- Student drinking
- Binge drinking
- Drinking and driving
- Alcohol abuse
- Alcohol dependence

### ALCOHOL & POTENTIAL EFFECTS

- **Depressant** drug – slows you down
- Short-term effects (e.g., **loss of coordination**)
- Long-term effects (e.g., **memory loss**)
- Chronic harms (e.g., **liver disease**)
- Acute harms (e.g., **alcohol poisoning**)

Health Canada, 2012

## STUDENT DRINKING

- Canadians 15+ years, **78%** alcohol use reported
- In prairie provinces, about **50%** respondents engaged in risky drinking **monthly**
- About **20%** reported risky drinking **once a week**
- **Risky drinking** = presence of severe consequences of drinking (e.g., **injury, unprotected sex, drinking and driving**)

Mattam, 2011; Health Canada, 2012

## BINGE DRINKING

- Can mean **5** or more drinks in **2 hours** for **men**
- **4** or more drinks in **2 hours** for **women**
- **Out of control behaviour** is a sign of binge drinking

Mattam, 2011

## DRINKING AND DRIVING

- **Dominant** factor in **casualty** collisions in Saskatchewan
- Province has **worst** per capita rate of **impaired driving deaths** in Canada
- Since 2006, **increase** in number alcohol-related **casualty** collisions in province

Students Against Drinking & Driving Saskatchewan, 2011; Mattam Against Drunk Driving, 2012

## ALCOHOL ABUSE

- Failure to fulfill **major responsibilities**
- Drinking in **physically dangerous** situations
- Recurring alcohol-related **legal problems**
- Continued drinking despite ongoing **relationship problems** that are caused or worsened by the drinking

Health Canada, 2012

## ALCOHOL DEPENDENCE

- Consumption of alcohol at levels that interfere with **physical and mental health** and with **family and social responsibilities**
- Alcoholics will **continue to drink** despite serious health, family, or legal problems
- **2.6%** Canadians aged **15+years** reported symptoms consistent with alcohol dependence

Canada Health, 2008

## APPENDIX N: STUDY 2 DIRECT ATTITUDES MEASURE

As you know, the age at which a woman becomes a mother can vary widely. Some women become mothers very early on in their life, while others become mothers later in their life. The present survey is part of an investigation that tries to discover some of the reasons why women become mothers earlier or later in life. Specifically, we are interested in your personal opinions regarding delaying motherhood.

By delaying motherhood we mean becoming pregnant past the age of 30 years.

Please read each question carefully and answer to the best of your ability. There are no correct or incorrect responses; we are merely interested in your personal point of view.

*Thank you for your participation in this study.*

Please circle only one number closest to the descriptor that represents how you feel (*see example below*).

*Example:*

*Waiting to become pregnant for the first time until after the age of 30 would be...*

Exciting	1	2	(3)	4	5	6	7	Boring
----------	---	---	-----	---	---	---	---	--------

*Waiting to become pregnant for the first time until after the age of 30 would be...*

1.	Unpleasant	1	2	3	4	5	6	7	Pleasant
2.	Costly	1	2	3	4	5	6	7	Rewarding
3.	Foolish	1	2	3	4	5	6	7	Wise
4.	Unsafe	1	2	3	4	5	6	7	Safe
5.	Beneficial	1	2	3	4	5	6	7	Harmful <b>R</b> <sup>5</sup>
6.	Meaningful	1	2	3	4	5	6	7	Meaningless <b>R</b>
7.	Enjoyable	1	2	3	4	5	6	7	Not Enjoyable <b>R</b>
8.	Bad	1	2	3	4	5	6	7	Good
9.	Relaxing	1	2	3	4	5	6	7	Stressful <b>R</b>
10.	Worthless	1	2	3	4	5	6	7	Valuable
11.	Energizing	1	2	3	4	5	6	7	Tiring <b>R</b>

<sup>5</sup> R indicates that this item was reverse coded.

APPENDIX O: STUDY 2 DIRECT SUBJECTIVE NORM MEASURE

In this section you will be asked to indicate your level of agreement or disagreement with the statements. Please circle a number closest to the descriptor that represents your response. Please circle only one response.

**12. Most people who are important to me think that I should delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**13. Most of the women I know have delayed motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**14. Most of my friends intend to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**15. It is expected of me that I delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

APPENDIX P: STUDY 2 DIRECT PERCEIVED CONTROL MEASURE

In this section you will be asked to indicate your level of agreement or disagreement with the statements. Please circle a number closest to the descriptor that represents your response. Please circle only one response.

**16. For me to delay motherhood would be extremely difficult. R<sup>6</sup>**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**17. Whether or not I delay motherhood is completely up to me.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**18. I am confident that if I wanted to delay motherhood I could.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**19. For me, it would be impossible to delay motherhood. R**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

---

<sup>6</sup> R indicates that this item was reverse coded.

## APPENDIX Q: STUDY 2 BELIEF BASED ATTITUDES MEASURE

**In this section you will be asked to indicate the likelihood of a particular situation and your assessment of how good or bad that situation might be. Please circle a number closest to the descriptor that represents your response. Please circle only one response.**

As a reminder, by **delaying motherhood** we mean becoming pregnant past the age of 30 years.

### **24. Delaying motherhood would help me to become financially secure.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**For me, being financially secure is...**

Bad:                  1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

### **26. Delaying motherhood would help me to establish a career.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**For me, establishing a career is...**

Bad:                  1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

### **27. Delaying motherhood would help me to establish a stable, committed relationship.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**For me, establishing a stable, committed relationship is...**

Bad:                  1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

### **28. Delaying motherhood would allow me to have time to travel.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**For me, having time to travel is...**

Bad:                  1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely



**29. Delaying motherhood would help me to better handle the responsibilities of motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**For me, being able to handle the responsibilities of motherhood is...**

Bad:              1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**30. Delaying motherhood would help me to become more emotionally mature before motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**For me, being more emotionally mature before motherhood is...**

Bad:              1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**31. Delaying motherhood would result in pregnancy-related health risks for myself. R<sup>7</sup>**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**For me, pregnancy health-risks are...**

Bad:              1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**32. Delaying motherhood would result in health risks for my baby. R**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**For me, health risks for my baby are...**

Bad:              1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

**33. Delaying motherhood would decrease my ability to become pregnant. R**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

---

<sup>7</sup> R indicates that this item was reverse coded.

**For me, a decreased ability to become pregnant is...**

Bad:      1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

**34. Delaying motherhood would result in me having less energy to care for a child. R**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

**For me, having less energy to care for a child is...**

Bad:      1                  2                  3                  4                  5                  6                  7                  :Good  
Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

## APPENDIX R: STUDY 2 BELIEF BASED SUBJECTIVE NORMS MEASURE

**In this next section you will be asked to indicate the likelihood of a person or group holding a particular opinion and your assessment of how important that opinion is to you. Please circle a number closest to the descriptor that represents your response. Please circle only one response. Please check “N/A” if a question is not applicable for you.**

As a reminder, by **delaying motherhood** we mean **becoming pregnant past the age of 30 years.**

### **35. My partner/spouse thinks I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are your partner/spouse’s opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

### **36. My mother thinks I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are your mother’s opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

### **37. My father thinks I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are your father's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**38. My siblings/cousins think I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are your siblings/cousin's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**39. My grandparents think I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are your grandparent's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**40. My friends think I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are your friend's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ **Not applicable to me**

**41. My physician thinks I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ Not applicable to me

**With respect to motherhood, how important are your physician's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ Not applicable to me

**42. My religious community thinks I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ Not applicable to me

**With respect to motherhood, how important are your religious community's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ Not applicable to me

**43. My cultural group/community thinks I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ Not applicable to me

**With respect to motherhood, how important are your cultural group/community's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely      Moderately      Slightly      Neither      Slightly      Moderately      Extremely

☐ Not applicable to me

**44. Feminist groups think I should delay motherhood.**

Unlikely:      1                  2                  3                  4                  5                  6                  7                  :Likely  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

**With respect to motherhood, how important are feminist group's opinions to you?**

Unimportant:      1                  2                  3                  4                  5                  6                  7                  :Important  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

☐ **Not applicable to me**

APPENDIX S: STUDY 2 BELIEF BASED PERCEIVED CONTROL MEASURE

**In this next section you will be asked to indicate the likelihood of a particular situation your assessment of whether that situation will make delaying motherhood easier or not. Please circle a number closest to the descriptor that represents your response. Please circle only one response.**

As a reminder, by **delaying motherhood** we mean becoming pregnant past the age of 30 years.

**45. I will have debt (e.g., student loans, credit card) in the future.**

*Unlikely:*      1                  2                  3                  4                  5                  6                  7                  *:Likely*  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**If I had debt, it would make it easier for me to delay motherhood.**

*Disagree:*      1                  2                  3                  4                  5                  6                  7                  *:Agree*  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**46. Fertility treatments (e.g., in vitro fertilization (IVF)) will be successful in helping me to get pregnant if I have difficulties in the future.**

*Unlikely:*      1                  2                  3                  4                  5                  6                  7                  *:Likely*  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**Successful fertility treatments would make it easier for me to delay motherhood.**

*Disagree:*      1                  2                  3                  4                  5                  6                  7                  *:Agree*  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**47. I will be able to afford fertility treatments (e.g., IVF) to help me get pregnant if I have difficulties conceiving in the future.**

*Unlikely:*      1                  2                  3                  4                  5                  6                  7                  *:Likely*  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**Affording fertility treatments would make it easier for me to delay motherhood.**

*Disagree:*      1                  2                  3                  4                  5                  6                  7                  *:Agree*  
Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**48. I will be fertile past the age of 30.**

*Unlikely:*      1                  2                  3                  4                  5                  6                  7                  *:Likely*  
Extremely    Moderately    Slightly    Neither    Slightly    Moderately    Extremely

**Being fertile past the age of 30 would make it easier to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly   Mostly   Slightly   Neither   Slightly   Mostly   Strongly

**49. I will be able to get pregnant when I want in the future.**

Unlikely:      1            2            3            4            5            6            7            :Likely  
                 Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

**Being able to get pregnant when I want would make it easier to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly   Mostly   Slightly   Neither   Slightly   Mostly   Strongly

**50. I will be in a relationship (e.g., committed relationship, married) in the future.**

Unlikely:      1            2            3            4            5            6            7            :Likely  
                 Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

**Being in a relationship would make it easier to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly   Mostly   Slightly   Neither   Slightly   Mostly   Strongly

**51. I will be using birth control (e.g., birth control pills) in the future.**

Unlikely:      1            2            3            4            5            6            7            :Likely  
                 Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

**Using birth control would make it easier to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly   Mostly   Slightly   Neither   Slightly   Mostly   Strongly

**52. I will be physically healthy in the future.**

Unlikely:      1            2            3            4            5            6            7            :Likely  
                 Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely

**Being physically healthy would make it easier to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly   Mostly   Slightly   Neither   Slightly   Mostly   Strongly

**53. I will desire to have children in the future.**

Unlikely:      1            2            3            4            5            6            7            :Likely  
                 Extremely   Moderately   Slightly   Neither   Slightly   Moderately   Extremely



**Desiring children would make it easier to delay motherhood.**

<u>Disagree:</u>	1	2	3	4	5	6	7	<u>:Agree</u>
	Strongly	Mostly	Slightly	Neither	Slightly	Mostly	Strongly	

APPENDIX T: STUDY 2 DIRECT INTENTIONS MEASURE

In this section you will be asked to indicate your level of agreement or disagreement with the statements. Please circle a number closest to the descriptor that represents your response. Please circle only one response.

**20. I plan to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**21. I will make an effort to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**22. It is important to me to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

**23. I intend to delay motherhood.**

Disagree:      1            2            3            4            5            6            7            :Agree  
                 Strongly    Mostly    Slightly    Neither    Slightly    Mostly    Strongly

## APPENDIX U: STUDY 2 PERSONAL AND DEMOGRAPHIC QUESTIONS

**In this section you will be asked about some questions related to your intentions as well as some demographic questions. Please answer using the response options provided.**

**54. Do you currently have children? (please check one)**

- ☐ Yes
- ☐ No

**55. I intend to one day become pregnant (please check only one)**

- ☐ Strongly disagree
- ☐ Mostly disagree
- ☐ Slightly disagree
- ☐ Neither disagree nor agree
- ☐ Slightly agree
- ☐ Mostly agree
- ☐ Strongly agree

**56. How old do you intend to be (were you) when you give (gave) birth to your first child?  
(list age in years)**

---

**57. How old do you intend to be when you give birth to your last child? (list age in years)**

---

**58. How many children do you intend to give birth to in your life? (list number)**

---

**59. In general, how important is it to you that you become pregnant during your life?  
(please check only one):**

- ☐ Not at all important
- ☐ Unimportant
- ☐ Neither unimportant nor important
- ☐ Important
- ☐ Extremely important

**60. If you were having trouble conceiving a child, how likely is it that you would intend to seek medical intervention? (please check only one):**

- ☐ Not at all likely
- ☐ Unlikely
- ☐ Neither unlikely nor likely
- ☐ Likely
- ☐ Extremely likely

**Demographics**

**61. Sex (please check one)**

- ☐ Male
- ☐ Female

**62. Age (list age in years)**

---

## APPENDIX V: STUDY 2 DEBRIEFING FORM



### Young Women's Intentions regarding Motherhood

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Thank you for your participation in this study! Your participation is sincerely appreciated, and we hope that you have found your experience to be interesting. As noted in the consent form provided to you, this study is examining individual reproductive intentions regarding delayed childbearing. Our main research questions are: 1) Can the theory of planned behavior be applied for predicting women's intentions to delay childbearing? And 2) Does the provision of detailed, accurate, and accessible information alter individual attitudes and levels of perceived control surrounding delayed childbearing?

To examine our research questions, we designed a study in which there were two different groups. Some participants have been asked to watch a Powerpoint presentation on fertility-related facts and others have been asked to watch a Powerpoint presentation on alcohol-related facts. Participants from each group are asked to complete the same survey examining reproductive intentions and components of the theory of planned behaviour. We could not reveal the full purpose or design of the experiment to you at the beginning of this study because we did not want to influence your responses on the survey. Furthermore, we want to be able to make comparisons between the experimental (fertility facts) and control (alcohol facts) group to see if the provision of information related to fertility has an impact on women's reproductive intentions.

Knowledge about fertility health issues is important for people to have in order to prevent fear, unnecessary delay in seeking fertility treatment, and infertility or involuntary childlessness. To address the significant lack of awareness regarding fertility and infertility treatments, and trends in delayed childbearing among the general public, many researchers have argued for the need to improve education on these topics. However, the impact of education efforts targeting women's intentions to delay childbearing has not yet been examined. Furthermore, the existing literature is based on descriptive, atheoretical research that is limited in terms of informing intervention protocols. In the future, we would like to expand on the existing literature by examining the impact of education initiatives on young women's reproductive intentions.

Our two main hypotheses are that the theory of planned behavior will provide an adequate framework for examining women's intentions to delay childbearing and that the provision of detailed, accurate, and accessible information will alter young women's intentions to delay

childbearing. The goal of the proposed investigation is to examine individual intentions regarding delayed childbearing. This information will then lead to the development of future studies examining this issue further.

The results of this study will be posted on our reproductive psychology research team website ([www.reproductivepsy.usask.ca](http://www.reproductivepsy.usask.ca)) at the end of the study (August 2013). You may also choose to contact the researchers by email for a summary of the results. If you are interested in see the Powerpoint presentation that you did not get to view during your participation in this study, you may contact the researchers and they can send you the Powerpoint file.

Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office [ethics.office@usask.ca](mailto:ethics.office@usask.ca) (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

**Researchers:** Linzi Williamson, Applied Social Psychology masters student, supervised by Dr. Karen Lawson, Department of Psychology, University of Saskatchewan.

## APPENDIX W: STUDY 2 INTERVENTION MANIPULATION CHECK

**These first few questions are going to test your fertility knowledge. Please try to provide the best answer or your best guess. This is not a test, so we will not be marking your responses as correct or incorrect. (Please circle your response):**

- 1. Biologically, the optimum time for having children is:**
  - A. 20 to 25 years
  - B. 34 to 37 years
  - C. 40 to 45 years
  - D. 16 to 19 years
- 2. A significant decline in fertility for women actually begins to occur at age:**
  - A. 16 years
  - B. 28 years
  - C. 40 years
  - D. 32 years
- 3. Each cycle of in vitro fertilization ( IVF is a procedure whereby sperm and eggs are fertilized in a laboratory and three to five days later, the resulting embryo is transferred to the woman's uterus) costs:**
  - A. \$500 to 1500 CDN
  - B. \$70,000 to 80,000 CDN
  - C. \$5000 to \$9000 CDN
  - D. \$11,000 to 13,000 CDN
- 4. Approximately what percentage of assisted reproductive technology (ART) cycles result in pregnancies for women over age 42?**
  - A. 52%
  - B. 33%
  - C. 9%
  - D. 17%

## APPENDIX X: TPB COMPONENT SURVEY RESPONSE FREQUENCY TABLES

Response frequencies for direct measure of attitudes toward delaying childbearing.

<i><b>Waiting to become pregnant for the first time after age 35 would be...</b></i>	1	2	3	4	5	6	7
Unpleasant/Pleasant	4.3	18.8	30.4	15.9	21.7	7.2	1.4
Costly/Rewarding	2.9	2.9	16.2	27.9	22.1	23.5	4.4
Foolish/Wise	2.9	2.9	21.7	31.9	17.4	15.9	7.2
Unsafe/Safe	2.9	15.9	23.2	24.6	21.7	8.7	2.9
Beneficial/Harmful	0	11.6	24.6	27.5	23.2	13.0	0
Meaningful/Meaningless	1.4	1.4	5.8	34.8	27.5	18.8	10.1
Enjoyable/Not Enjoyable	0	8.7	20.3	21.7	21.7	20.3	7.2
Bad/Good	1.4	4.2	20.3	33.3	18.8	17.4	4.3
Stressful/Relaxing	4.3	30.4	26.1	24.6	10.1	2.9	1.4
Worthless/Valuable	0	1.4	0	27.5	43.5	17.4	10.1
Tiring/Energizing	8.7	37.7	24.6	20.3	4.3	2.9	1.4



Response frequencies for direct measure of subjective norms, perceived control, and intentions to delay motherhood.

	Strongly Disagree	Mostly Disagree	Slightly Disagree	Neither	Slightly Agree	Mostly Agree	Strongly Agree
Most people who are important to me think I should delay motherhood	4.3	15.9	13.0	26.1	15.9	17.4	7.2
Most of the women I know have delayed motherhood	13.0	26.1	15.9	14.5	18.8	7.2	4.3
Most of my friends intend to delay motherhood	5.8	24.6	11.6	7.2	24.6	20.3	5.8
It is expected of me that I delay motherhood	20.3	15.9	17.4	15.9	17.4	10.1	2.9
For me to delay motherhood would be extremely difficult	8.7	8.7	13.0	11.6	14.5	21.7	21.7
Whether I delay motherhood is completely up to me	1.4	2.9	1.4	2.9	2.9	34.8	53.6
I am confident that if I wanted to delay motherhood I could	0	2.9	2.9	2.9	20.3	33.3	37.7
For me, it would be impossible to delay motherhood	46.4	18.8	7.2	13.0	10.1	1.4	2.9
I plan to delay motherhood	14.5	20.3	10.1	13.0	14.5	20.3	7.2
I will make an effort to delay motherhood	14.5	21.7	11.6	10.1	15.9	18.8	7.2
It is important to me to delay motherhood	15.9	26.1	11.6	11.6	8.7	20.3	5.8
I intend to delay motherhood	18.8	20.3	11.6	7.2	15.9	17.4	8.7

Response frequencies for belief-based attitudes regarding delayed motherhood - likelihood of future situation.

<b><i>Delaying motherhood would...</i></b>	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
...help me to become financially secure	0	0	1.4	0	14.5	53.6	30.4
...help me to establish a career	0	2.9	1.4	2.9	13.0	46.4	33.3
...help me establish a stable, committed relationship	0	7.2	4.3	21.7	18.8	29.0	18.8
...allow me to have time to travel	0	1.4	1.4	4.3	23.2	24.6	44.9
...help me to better handle the responsibilities of motherhood	1.4	10.1	8.7	18.8	27.5	21.7	11.6
...help me to become more emotionally mature before motherhood	0	7.2	10.1	11.6	27.5	24.6	18.8
...result in pregnancy-related health risks for myself	10.1	36.2	26.1	15.9	4.3	4.3	2.9
...result in health risks for my baby	10.1	26.1	43.5	10.1	5.8	1.4	2.9
...decrease my ability to become pregnant	17.4	31.9	36.2	7.2	2.9	2.9	1.4
...result in me having less energy to care for a child	4.3	34.8	20.3	10.1	11.6	13.0	5.8

Response frequencies for belief-based attitudes regarding delayed motherhood - assessment of future situation.

	Extremely Bad	Moderately Bad	Slightly Bad	Neither	Slightly Good	Moderately Good	Extremely Good
For me, being financially secure is...	0	0	0	0	4.3	43.5	52.2
For me, establishing a career is...	0	0	2.9	0	0	34.8	52.2
For me, establishing a stable, committed relationship is...	1.4	0	0	0	5.8	24.6	68.1
For me, having time to travel is...	0	0	0	7.2	29.0	26.1	37.7
For me, being able to handle the responsibilities of motherhood is...	0	0	0	1.4	4.3	27.5	66.7
For me, being more emotionally mature before motherhood is...	0	0	0	7.2	15.9	26.1	50.7
For me, pregnancy health risks are...	34.8	39.1	13.0	11.6	0	1.4	0
For me, health risks for my baby are...	76.8	13.0	5.8	2.9	0	1.4	0
For me, a decreased ability to become pregnant is...	31.9	33.3	17.4	13.0	1.4	2.9	0
For me, having less energy to care for a child is...	34.8	46.4	18.8	0	0	0	0

Response frequencies for belief-based subjective norms – likelihood of person/group holding opinion.

<i>(person/group) thinks I should delay motherhood.</i>	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely	Not Appli cable
Partner/Spouse	5.8	11.6	2.9	7.2	7.2	5.8	10.1	49.3
Mother	8.7	18.8	7.2	24.6	17.4	11.6	8.7	2.9
Father	5.8	15.9	2.9	40.6	10.1	7.2	11.6	5.8
Sibling/Cousin	7.2	11.6	11.6	39.1	15.9	2.9	7.2	4.3
Grandparents	14.5	10.1	14.5	21.7	7.2	7.2	8.7	15.9
Friends	2.9	21.7	18.8	23.2	13.0	15.9	4.3	0
Physician	5.8	7.2	4.3	39.1	4.3	5.8	0	33.3
Religious Community	1.4	8.7	0	17.4	7.2	5.8	5.8	53.6
Cultural Group	5.8	5.8	5.8	24.6	8.7	10.1	1.4	37.7
Feminist Groups	2.9	2.9	2.9	24.6	10.1	18.8	2.9	34.8

Response frequencies for belief-based subjective norms – importance of referent person/group's opinion.

<i><b>With respect to motherhood, how important are your (person/group)'s opinions to you?</b></i>	Extremely Unimportant	Moderately Unimportant	Slightly Unimportant	Neither	Slightly Important	Moderately Important	Extremely Important	Not Applicable
Partner/Spouse	0	0	1.4	1.4	4.3	26.1	33.3	33.3
Mother	2.9	2.9	2.9	4.3	24.6	34.8	27.5	0
Father	1.4	4.3	5.8	2.9	31.9	31.9	17.4	4.3
Sibling/Cousin	5.8	8.7	7.2	8.7	30.4	21.7	14.5	2.9
Grandparents	7.2	8.7	8.7	8.7	24.6	17.4	11.6	13.0
Friends	4.3	5.8	10.1	10.1	39.1	23.2	7.2	0
Physician	1.4	4.3	1.4	7.2	24.6	26.1	14.5	20.3
Religious Community	7.2	5.8	2.9	10.1	13.0	5.8	5.8	49.3
Cultural Group	4.3	14.5	8.7	18.8	11.6	1.4	2.9	37.7
Feminist Groups	17.4	17.4	8.7	18.8	4.3	1.4	2.9	29.0

Response frequencies for belief-based perceived control – likelihood of future situation.

<i><b>In the future...</b></i>	Extremely Unlikely	Moderately Unlikely	Slightly Unlikely	Neither	Slightly Likely	Moderately Likely	Extremely Likely
I will have debt	1.4	13.0	7.2	1.4	21.7	27.5	27.5
Fertility treatments will be successful in helping me to get pregnant	2.9	10.1	5.8	20.3	40.6	17.4	2.9
I will be able to afford fertility treatments	8.7	5.8	23.2	11.6	15.9	27.5	7.2
I will be fertile past the age of 30	0	5.8	10.1	11.6	26.1	40.6	5.8
I will be able to get pregnant when I want	1.4	2.9	7.2	5.8	33.3	40.6	8.7
I will be in a relationship	0	0	0	7.2	8.7	42.0	42.0
I will be using birth control	5.8	8.7	5.8	5.8	4.3	31.9	37.7
I will be physically healthy	0	0	1.4	2.9	8.7	65.2	21.7
I will desire to have children	1.4	1.4	2.9	2.9	11.6	17.4	62.3

Response frequencies for belief-based perceived control – assessment of situation making delay motherhood easier.

<i>(situation) would make it easier for me to delay motherhood.</i>	Strongly Disagree	Mostly Disagree	Slightly Disagree	Neither	Slightly Agree	Mostly Agree	Strongly Agree
If I had debt	0	5.8	2.9	8.7	33.3	40.6	8.7
Successful fertility treatments	8.7	17.4	10.1	17.4	27.5	17.4	1.4
Affording fertility treatments	8.7	18.8	7.2	14.5	26.1	20.3	4.3
Being fertile past the age of 30	4.3	7.2	10.1	7.2	24.6	31.9	14.5
Being able to get pregnant when I want	1.4	5.8	7.2	13.0	26.1	31.9	14.5
Being in a relationship	4.3	20.3	20.3	13.0	21.7	15.9	4.3
Using birth control	4.3	4.3	7.2	13.0	15.9	20.3	34.8
Being physically healthy	1.4	10.1	8.7	24.6	27.5	15.9	11.6
Desiring children	26.1	26.1	20.3	15.9	2.9	7.2	1.4